Passage and Implementation of California's Marine Life Management Act

Prepared under the MLMA Lessons Learned Project

7/15/2009

About the MLMA Lessons Learned project:

The Harty Conflict Consulting & Mediation [HCCM] project team was selected to conduct a lessons learned study of the Marine Life Management Act [MLMA] as described in the RFP issued by the Ocean Protection Council on October 27, 2008. In the words of the Request for Proposals "Both DFG and the Commission have agreed that summarizing lessons learned from the previous FMP-approval processes could help to streamline efforts in the future. Additionally, because each past FMP creation process involved vastly different protocols, standards, costs, and time investments, a study evaluating comparative lessons learned could function as a useful reference for future efforts. The study will evaluate the successes and challenges of the implementation of the MLMA and provide recommendations to direct future MLMA efforts by DFG and the Commission."

About this document:

This report is the first in a set of three documents being prepared to assess lessons learned about the implementation of the MLMA. This report is intended to be descriptive. It will provide a foundation for further research, public input and discussion, and writing of a second report evaluating implementation of the MLMA, to be published this fall. A third report, to be published by the end of the year, will provide recommendations to improve future implementation of the MLMA. The three reports will be combined in a final project report.

Comments invited:

Comments are invited to improve the accuracy of this draft report. Specific MLMA experiences and identification of reliable sources of relevant information are particularly welcomed. Those comments will inform revisions of this draft in preparation of the final report.

Please send comments in electronic format to: MLMALL@scc.ca.gov. **Due by:** 8.8.09

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LESSONS LEARNED from California's Marine Life Management Act

DRAFT TASK ONE REPORT

Implementation of the MLMA

July 15, 2009

Prepared by (in alphabetical order):

J. Michael Harty, Michael C. Healey, Suzanne Iudicello,
DeWitt John, John J. Kirlin, Ralph Larson

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Executive Summary

The California Marine Life Management Act (MLMA) of 1998 has been described by individuals involved in its passage and implementation as "dramatic change," a "paradigm shift," and a "new course for management of the State's living marine resources." The legislation was initially introduced by Assembly Member Fred Keeley in February 1997 as AB 1241. That initial version proposed an umbrella statute that would provide a framework for managing all manner of marine life—interactions between birds and fishing nets, depredation of catches by marine mammals, spatial management and marine reserves, allocation and conservation.

While the legislation signed by Governor Pete Wilson in 1998 was considerably narrower in scope than AB 1241 as introduced, it nonetheless called for substantial changes in the way fishery management was conducted in California. New requirements included improved science, wider constituent involvement, and regulatory decision-making supported by fishery information and constrained by limits that would insure sustainable catches. The Legislature transferred to, or created authority for, the California Fish and Game Commission (Commission) and California Department of Fish and Game (Department). However, the Legislature retained policy-making authority for numerous commercial fisheries, including several of high value.

Effective policy implementation depends on specific requirements, powers conferred, resources available, and remedies provided. The changes in legislative language as the MLMA was enacted resulted in a statute with limited explicit requirements, limited powers, no continuing provision of resources, and no remedies for failures. While the intent of the original AB 1241 could understandably be characterized as dramatically changing policies on use of California ocean resources, the MLMA as enacted was narrower in its aspirations. At least as importantly, some of the provisions of AB 1241 intended to achieve more effective policy making, such as establishing a "Marine Life Management Commission" with significant regulatory authority, were removed and/or weakened before passage of the bill. The absence of a stable funding stream and competing demands for scarce resources set the stage for uneven progress in MLMA implementation.

The Commission and Department achieved three of the act's milestones within three years of passage, including approving Fishery Management Plans for white seabass and the nearshore fishery, development of a MLMA Master Plan and publishing the first Status of California's Living Marine Resources. However, significant management activity under MLMA principles and guidance slowed after 2002 in response to an economic downturn, state budget cuts, and an eclipsing of the MLMA by the higher profile process of the Marine Life Protection Act (MLPA), which originally was part of AB 1241 but was enacted separately a year later. The market squid Fishery Management Plan was adopted in 2004, responsive to legislative direction in 2001. The Abalone Recovery and Management Plan adopted in 2005 does not follow the MLMA and no commercial abalone fishery exists in California. In sum, three

fisheries (white seabass, nearshore and squid) currently operate under MLMA Fishery Management Plans. Since passage of the MLMA, significant amendments have been made to the Fish and Game code sections managing valuable fisheries, including Dungeness crab and halibut, without reference to the MLMA.

This report is the first in a set of three documents being prepared to assess lessons from implementation of the MLMA. This report is intended to be descriptive. It will provide a foundation for further research, public input and discussion, and writing of a second report evaluating implementation of the MLMA scheduled to be published this fall. A third report, scheduled to be published at the end of the year, will provide recommendations to improve future implementation of the MLMA.

This initial report has four parts. Part 1 describes the general context for enactment of the MLMA. It covers the basis for fishery management, the evolution of California and federal fishery management in the years leading up to enactment of the MLMA, initial goals and proposals of the sponsors of AB 1241, and the final version of the bill. Part 2 analyzes how the MLMA changed California's policy approach to fishery management. It reviews the statutory language, different expectations about what the Act might accomplish, and the funding available for implementation. Part 3 describes the implementation of the MLMA to date. It focuses on products specified in the Act, including the Master Plan and Status Reports, the Fishery Management Plans for Nearshore Fisheries and for white seabass, and on other plans and regulatory activities. Part 3 also includes a short summary of amendments to the MLMA. Part 4 is a brief conclusion that notes recent changes in federal legislation and explains how this report provides a foundation for subsequent reports focused on evaluation and recommendations.

The information in the report is taken from the statute and legislative history, California Fish and Game Code, regulations, published reports and documents, and interviews with persons who had direct experience with MLMA enactment and implementation.

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Credits for cover photographs:

Lobster pull: Matt Kay and Sam Shrout, taken at Santa Rosa Island

Blue rockfish in kelp: Curt Degler, taken at Bluefish Cove, Point Lobos

Sheephead: Ben Troxell, taken at Channel Islands

Part 1: The Context for Enacting the Marine Life Management Act

MLMA proponents sought major changes in use of ocean resources

The authors of the "Sea Life Recovery and Management Act of 1997 [Sea Life Recovery Act, AB 1241]," which eventually became the "Marine Life Management Act of 1998 [MLMA]," sought fundamental changes in California public policies regarding use of ocean resources. The initial bill sought to address California ocean life management in the broadest sense, including more than fisheries, as detailed below. The bill finally enacted as the Marine Life Management Act of 1998 reflected a context of increasing public awareness and concern about the dangers of over-exploitation of fisheries, debates about policy responses, and overlapping governmental decision makers.

The years leading up to and immediately following the passage of the MLMA marked a period of profound change in the fishing world. Policy approaches changed in response to cover stories in national magazines describing the collapse of New England groundfish and Pacific coast salmon, widespread public awareness of worldwide declines in fish populations, and the entry of foundations and environmental advocacy groups into the debate on overfishing and bycatch. Policy making previously characterized as responsive to specific fishing groups shifted to a national policy debate about the long-term management of fisheries. This shift culminated in major reform in the federal management structure as amended in the 1996 Sustainable Fisheries Act. The emergence of new policies such as area management and rights-based systems added complexity to what had been a system designed mainly to determine total allowable catch and allocate catch among competing user groups.

In California, the period preceding passage of the MLMA included events such as net bans, wildlife-fishery conflicts, allocation disputes between sport and commercial users, and closure of the recreational abalone fishery except north of San Francisco Bay (no commercial take of abalone is allowed in California). During the late 1990s, west coast salmon abundance had declined to only a fraction of historical levels, damaging the economies of coastal communities in Northern California. Northern Coho salmon were listed as "endangered" under the federal Endangered Species Act [ESA] in 1997, after a long battle among state and federal agencies, lawyers, the courts, and advocacy groups. By 1999, 26 distinct population segments of five salmon species were listed as either endangered or threatened under the ESA, 11 of them in California.[1] Just as on the national scene, conservation and environmental advocates had taken a more active role in fishery management, and in 1992 the first environmentalist

[1] E. Buck, Congressional Research Service, "Pacific Salmon and Steelhead Trout: Managing under the Endangered Species Act." March 2006.

was appointed to the federally created Pacific Fishery Management Council [PFMC] groundfish advisory panel.

The Sea Life Recovery and Management Act [see above] drafters derived many of its principles from the larger national debate about ending overfishing, protecting habitat, reducing bycatch, employing ecosystem principles to fishery management, and sustaining important natural resources. Figure 1 arrays major events related to fisheries on a timeline. Seen in the sweep of events related to fisheries shown in Figure 1 and the evolution of California marine resource authorities seen in Table 1 below, the MLMA is one policy-making effort in a series of institutional design and policy-making efforts initiated long before 1998 and continuing through 2009, with additional changes anticipated in the future. Appropriately, the Figure 1 time line includes not only policy making but also important marine fisheries events or actions, most often linked to a decline in abundance. These changes in understanding of declining fish populations were the stimulus for changes in policies.

Figure 1: Timeline of fisheries related events, 1990s-present

California			Federal
MLMA Events	Other		
		1994-95	• SALMON DISASTER DECLARATIONS: U.S. Dept. of Commerce declares federal fishery disaster, enabling release of emergency disaster relief assistance. 5/26/1994 FR doc 94-22078 (Sept. 2, 2994); Aug. 2, 1995; 61 Fed Reg. 17879-17881 (April 23, 1996)
		1996	• MAJOR REFORMS: Passage of Sustainable Fisheries Act. Reauthorization of Magnuson Fishery Conservation and Management Act. 96 Pub. L. 561, 94 Stat. 3275
• Abalone closure		1997	• California salmon listed as endangered/threatened (62 Fed. Reg. 3308 (Jun. 18,1997)
• Legislature passes MLMA AB1241		1998	
	• Legislature passes MLPA	1999	
		2000	• PACIFIC GROUNDFISH DISASTER: Declaration of federal fishery disaster in west coast groundfish. The Secretary of Commerce announced the determination of a commercial fishery failure on January 19, 2000.
• First Status of fisheries published as California's Living Marine Resources: A status report • Master Plan		2001	
• White Seabass FMP • Nearshore FMP	• Channel Islands Marine Protected Areas adopted	2002	
• Status report updated with additional species		2003	
• Market squid FMP adopted 2004	• Ocean Protection Council created. Public Resources Code 35600-35625	2004	
• ARMP adopted		2005	
• Status Updates & State of Fisheries Ocean Protection Council created		2006	• Magnuson Stevens Reauthorization Act: California, Oregon and Washington delegated authority to manage Dungeness crab. 104 Pub. L. 208
	• Central Coast MLPA package adopted	2007	
• MLMA Lite (AB 2532) Vetoed	• Dungeness Crab Task Force (SB 1690) created by Legislature, August 2008.	2008	• Secretary of Commerce announces Salmon disaster declaration November 2008, continued in 2009
		2009	• Amendments to WC groundfish plan by PFMC; stocks rebuilding; quota program adopted. 74 Fed Reg 9874 (March 6, 2009)

Policy basis for fishery management

Ocean resources are considered public trust resources and are open to access by all citizens.[2] States grant the public the right to fish, but have a duty to protect and preserve ocean resources.[3] Management of marine fisheries in the United States involves three basic jurisdictions: federal, state, and international. Because fish populations often overlap jurisdictions, management is shared among states, between the federal government and the states, or between the federal government and other countries through bilateral or multilateral agreements. For example, vessels fishing off California's coast in the deep ocean for tuna may be governed by an international agreement administered by the Inter-American Tropical Tuna Commission. Vessels targeting herring or sardines beyond state waters are governed by federal regulations. Nearshore fisheries like squid and crab may come under state or federal regulation, while inshore shellfish harvest is entirely under state regulation.

The United States asserted control over its continental shelf (defined as less than 200 meters in depth) in 1945[4], established a 200 mile fishery conservation zone in 1976,[5] and asserted control over waters within 200 miles of shore in 1983.[6] Within this larger zone, the federal government has exclusive management authority for fisheries that occur in the so-called U.S. Exclusive Economic Zone, or EEZ. The EEZ is that area of the ocean that extends from the seaward boundaries of the coastal states (three nautical miles, in most cases) to 200 nautical miles off the coast of the United States.[7] Generally, a state has authority over fisheries out to three miles, and the federal government has authority from three to 200 miles. Individual states exercise management authority over fisheries that occur within their territorial waters, both fresh and saltwater. Interstate compacts and commissions on

BOX 1.
CALIFORNIA CONSTITUTION ARTICLE 4 SEC. 20. (a) The Legislature may provide for division of the State into fish and game districts and may protect fish and game in districts or parts of districts. (b) There is a Fish and Game Commission of 5 members appointed by the Governor and approved by the Senate, a majority of the membership concurring, for 6-year terms and until their successors are appointed and qualified. Appointment to fill a vacancy is for the unexpired portion of the term. The Legislature may delegate to the commission such powers relating to the protection and propagation of fish and game as the Legislature sees fit. A member of the commission may be removed by concurrent resolution adopted by each house, a majority of the membership concurring.

[2] *See, e.g.,* Arnold v. Mundy, 6 N.J. L. 1 (N.J. 1821) (landowner may not stop others from gathering oysters). For treatment of public trust, coastal states and fishery management, *see,* Ocean and Coastal Law and Policy, ABA 2007, at 52-53.
[3] Coastal States Organization, "Putting the Public Trust Doctrine to Work: the Application of the Public Trust Doctrine to the Management of the Lands, Waters, and Living Resources of the Coastal States," [2d ed. 1997] at 17-18.
[4]. President Truman, Proclamation 2667. http://trumanlibrary.org/publicpapers/index.php?pid=159&st=&st1=
[5] Magnuson Fishery Conservation and Management Act, 16 U.S.C. 1801 *et seq*., Pub. L. 94-265 (1976) [MFCMA]
[6] President Reagan declined to sign the Law of the Sea Convention, but established an Exclusive Economic Zone over living and non living resources within 200 nautical miles of the United States coast. http://www.oceanlaw.org/index.php?name=News&file=article&sid=73
[7] Texas, the Florida Gulf Coast, and Puerto Rico have fishery jurisdictions extending nine nautical miles offshore.

the Atlantic, Gulf, and Pacific coasts provide coordination for shared resources among the states.

Beginning in 1852, California asserted a state interest over California fishermen wherever they fished, and over vessels fishing in California waters or delivering landings, i.e., fish, to California ports. The Board of Fish Commissioners, the first wildlife conservation agency in the United States, was created in 1870 "to provide for the restoration and preservation" of fish in state waters. As seen in Box 1, the current Fish and Game Commission [Commission] was established by the state constitution in 1940[8] to protect and propagate fish, with powers to be delegated by the Legislature. The present Commission is tasked with making policy to guide the Department of Fish and Game and has general regulatory powers to set seasons, bag limits and methods of take for fish and wildlife species taken by hunters and anglers.[9]

What is now the Department of Fish and Game [Department or DFG] was established first in the 1920s as a Division of Fish and Game within the Department of Natural Resources. The Department is now one of eight departments under the California Natural Resources Agency. Among its other functions and duties, the Department is responsible for both stream and ocean fishery management programs, projects, and operations. Commercial fishing is limited to the ocean and bays of the state. The Marine Region, where ocean fishery authority resides, is one of seven regional divisions in the Department. Table 1 shows a history of California's living marine resource management authorities.

[8] Article 4, Section 20

[9] Fish and Game Code §§ 200-220.

Table 1. California marine resource management

Year	Action
1850	California statehood
1852	First California Fish & Game Act
1870	Board of Fish Commissioners created
1885	First Marine Patrol launched
1909	Fish and Game Commission reflects additional authority re: conservation
1927	Division of Fish & Game established by legislature; assumes administrative functions of Commission
1937	Fish and Game Commission membership increased from 3 to 5
1940	Constitutional amendment details terms, duties of commissioners
1945	Constitutional amendment delegates authority to regulate sport fishing and hunting
1947	Legislature establishes Marine Research Committee to aid commercial fisheries
1951	Reorganization Act elevates Division of Fish & Game to Department
1952	Marine Research Bureau becomes full branch
1957	Marine Resources Region created
1961	DF&G becomes part of new Resources Agency of California
1969	Department reorganizes to make Marine Resources a separate function for ocean management and protection; advisory committee established
1990	Marine Resources Protection Act directs commission to establish ocean ecological reserves
1997	Statewide Marine Region established
1998	MLMA enacted; delegates more authority to commission to manage commercial fisheries
1999	MLPA enacted to create an improved network of marine protected areas
2004	Ocean Protection Council created by Ocean Protection Act
2007	First package of MLPA marine protected areas adopted for Central Coast

Sources for Table: Department Strategic Plan, 130 Year Anniversary article.

Box 2. MFCMA National Standards

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield (see Glossary) from each fishery for the United States fishing industry.

2. Conservation and management measures shall be based on the best scientific information available.

3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and inter-related stocks of fish shall be managed as a unit or in close coordination.

4. Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

9. Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

10. Conservation and management measures shall, to the extent practicable, promote safety of human life at sea.

Federal fishery management

The enactment of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1976 was a turning point in the evolution of commercial and recreational fishing in the United States. Prior to the MFCMA most regulation was carried out by individual states and focused on fisheries within state waters. The purpose of the MFCMA was to prevent overfishing, especially by foreign fleets, and to allow overfished stocks to recover. The statute effectively "Americanized" fishing off the U.S. coast by establishing the Fishery Conservation Zone (FCZ) to exclude foreign fishing vessels.[10] This zone was later expanded to include activities besides fishing, and a U.S. Exclusive Economic Zone (EEZ) was declared in 1983.[11] Although some fish stocks recovered, such as Atlantic herring and mackerel, some experts argue that one consequence of the MFCMA was to replace foreign overfishing with domestic overfishing.[12]

The MFCMA created the current fishery management council system and set standards by which these bodies would manage fisheries in their regions.

[10] 16 U.S.C. §1821, Pub. L. 95-354 (1976). In the period from the 1960s to 1970s, more and more nations extended their fisheries jurisdictions, and the U.S. was one of numerous states that adopted 200-mile fishery zones.

[11] Presidential Proclamation 5030, Exclusive Economic Zone of the United States of America. 48 Fed. Reg. 10605 (March 10, 1983). Even though the U.S. did not join the U.N. Convention on the Law of the Sea until much later, acceptance of the agreement as customary international law influenced the proclamation of the EEZ. The Third United Nations Convention on the Law of the Sea, Dec. 10, 1982, 21 I.L.M. 1245. (Entered into force 16 November 1994) (hereinafter UNCLOS).

[12] M. Weber, FROM ABUNDANCE TO SCARCITY (2002), at 177-178; J.P. Wise, FEDERAL CONSERVATION AND MANAGEMENT OF MARINE FISHERIES OF THE UNITED STATES (1991) at 7.

The national standards (as amended) are provided in Box 2.

Significant additional federal reform occurred in 1996 with passage of the Sustainable Fisheries Act [SFA] and in 2006 with reauthorization including further directives from Congress to halt overfishing.[13] The SFA addressed overfishing in national standards, definitions, and requirements for councils, and in fishery management plans. The SFA set deadlines for fishery councils to update their fishery management plans, stop overfishing, and rebuild depleted fisheries. If the councils failed to take action, the Secretary of Commerce was mandated to step in to take conservation measures. The statutory language was interpreted in regulation and a series of technical workshops to elaborate on how the National Marine Fisheries Service would implement a precautionary approach.[14] The 2006 amendments to the Magnuson-Stevens Fishery Conservation and Management Act prohibited fishing more than maximum sustainable yield, or MSY, for economic or social reasons and mandated that fishery management plans define overfishing using "objective and measurable criteria for when the fishery . . . is overfished."[15]

While the MFCMA had been silent on the issue of bycatch, the 1996 SFA reforms added a definition of bycatch[16] and a new national standard calling for action to avoid bycatch or minimize it where it cannot be avoided.[17] Bycatch reduction is now part of required conservation and management measures in all fishery management plans. Protection of essential fish habitat (EFH) was explicitly cited as a purpose of the SFA and it required councils to develop measures to identify and protect essential fish habitat in fishery management plans by minimizing, to the extent practicable, the effects of fishing on EFH.[18]

California fisheries management before the MLMA

Fisheries management was complex before passage of the MLMA, was not made simpler by that Act, and remains very complex. The challenges of sorting out authorities of the Commission, the Department, and the Legislature are significant and are rivaled by the complexity of determining the authority of the State in relation to that of the federal government. Complexity, ambiguity, frequent disagreement and shifting interpretations frequently provide the context for policy implementation in the United States' federal system, and there should be no surprise that these issues arise in fisheries management policies.

[13] The Sustainable Fisheries Act amended the MFCMA and renamed it the Magnuson-Stevens Fishery Conservation and Management Act. This statute is also referred to as the Magnuson-Stevens Act, or MSA. Congress reauthorized the MSA in 2006 with significant amendments.
[14] Restrepo (Convenor) *et al*. 1998. *Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the MSFCMA*. NOAA Technical Memorandum NMFS-F/SPO July 1998.
[15] 16 U.S.C. 1853(a)(10).
[16] 16 U.S.C. §1802 (2)
[17] 16 U.S.C. §1851a(9)
[18] 16 U.S.C. §1853a(7); 16 U.S.C. §1855b(1)-(4).

Prior to enactment of the MLMA, California fishery management authority was exercised by the Legislature, the Department, and the Commission. Commercial fishing was generally "open access," meaning anyone could fish, unless regulated specifically by federal or state law. According to the Marine Region's website, management under this division of responsibility was "complicated, piecemeal, and oftentimes untimely, with necessary regulatory changes only occurring after much political deliberation and approval by both the Assembly and the Senate."[19] The pre-MLMA management approach has been described in legislative history, hearing records and interviews for this report as *ad hoc*, constituent casework, where industry and processor representatives had the ear of long-term members in the Assembly and Senate and relied on them for "quick fix band aids."

BOX 3. Legislatively Managed Fisheries
Barracuda, California (§§8382, 8384, 8386)
Bonito, Pacific (§8377)
Clams (§§ 8340-8343, 8346)
Croakers (spotfin croaker, yellowfin croaker, and California corbina; §8373)
Dungeness crabs (§§8275-8284)
Far offshore fishing (§§8110-8114)
Grunion (§8381)
Hagfish (§9001.6)
Halibut, California (§§8391-8392)
High seas interception salmon (§§ 8120-8123)
Marlin (§8393)
Scallop (rock, speckled; §8345)
Shark, angel (§8388)
Shark, leopard (§8388.5)
Shark, white (§§5517, 8599)
Skipjack (§8378)
Striped bass and sturgeon in nets (§8370-8371)
Surfperch (species not primarily inhabiting rocky reef or kelp habitat in nearshore waters; §8395)
Tuna (bluefin, yellowfin, albacore; §§8374-8376)
Yellowtail (§§8382, 8384, 8386-8387)
And, all other species not specifically listed in either Title 14 or Fish and Game Code §8140 and not primarily inhabiting rocky reef or kelp habitat in nearshore waters.

By the time the MLMA was introduced, the Legislature had enacted detailed fishery management measures including licenses, permits, fees, landings taxes, record keeping and reporting requirements, seasons, bag limits, gear restrictions, participation in federal buy-back programs, findings on state-federal fishery conflicts, reduction plant rules and standards, aquarium collection policies, enforcement policies, penalties, and limited entry programs covering dozens of species. The Legislature had also created advisory committees for salmon, Dungeness crab, recreational and commercial abalone fishermen, squid, gill and trammel net users, and sports fishermen interested in the Bay Delta Sport Fish Enhancement Stamp Fund. The Legislature specified how money from marine fishing fees, licenses, taxes and stamps would be spent. Commercial marine species for which the Legislature has complete management authority are listed in Box 3 with reference to the respective Fish and Game Code sections. However, term limits had resulted in departure of most legislators experienced with fisheries by 1998.

[19] http://www.dfg.ca.gov/marine/faqindx.asp FAQs: How has the Marine Life Management Act changed the responsibilities of the California Department of Fish and Game and the Fish and Game Commission?

According to its strategic plan,[20] the Commission's authorities before passage of the MLMA numbered more than 200 specific powers and duties, all of them delegated by the Legislature. These authorities included complete management for sport fisheries, including species taken in both sport and commercial sectors.[21] In addition, the Legislature had authorized the Commission to manage commercial fishery capacity reduction plans, and manage both sport and commercial fisheries for tidal invertebrates, kelp and aquatic plants, mussels, shrimp and prawns, abalone, sea urchins, and about two dozen fish species. The Legislature had also delegated limited authority to the Commission for management of commercial fisheries for a number of species managed under FMPs developed by the PFMC: coastal pelagic species (anchovy, mackerel, squid,[22] sardine), highly migratory species (sharks and swordfish), salmon, squid and groundfish. This authority was limited to adopting regulations not in conflict with the federal rules. The Commission also had authority for issuing and revoking permits for lobster. The Legislature also had directed the Commission to establish a capacity reduction program and provided authority to establish a fee system to be used to assist in federal buybacks of fishery permits and vessels.[23]

The Department collects and assesses information on marine species, provides scientific information to the Commission, implements and enforces regulations adopted by the Commission or enacted by the Legislature, implements and enforces federal fishery laws, has the authority to conform state regulations to federal rules, and monitors the effects of regulations. The budget for the Marine Region is funded by revenues from general funds, environmental license plate fees, federal trust funds, fishing licenses, landing taxes, permit fees and enhancement stamps. According to the Guide to the Marine Life Management Act, the Marine Region received its first major appropriation from the General Fund in FY 1999-2000 to implement the MLMA.

Before MLMA, the Department also managed in accordance with legislative delegations, captured in the Fish and Game Code. The general provisions outlining the Department's authority are found in Sections 1-89.1, 700-714, 850-858, 1000-1019, 1700, 1802, 2000-2019, and other chapters and sections related to conservation, wetlands, endangered species, importation and so on.

Sections of the Fish and Game Code related to fisheries and enacted prior to 1998 (though some were amended by the MLMA) are found in §90-99.5 (Marine Life Definitions), §1590-1591 (Marine Managed Areas), §2760-2765 (Fisheries Restoration), §6900-6930 (Salmon, Steelhead Trout and Anadromous Fisheries), §7100-7400 (Sport Fishing), §7600- 9055 (Commercial Fishing). The Department has authority to issue commercial fishing licenses, but the Commission has authority to revoke them. The Legislature delegated to the Department some duties for salmon management; authority to open and

[20] *California Fish & Game Commission Strategic Plan*, Dec. 4, 1998, p. 10

[21] This meant potentially different rules, adopted by different levels of government in response to different interests, for the same species being fished in the same state waters.

[22] The PFMC has delegated market squid management to the state as long as measures are consistent with the federal plan.

[23] Fish and Game Code §§7630, 8100-8104, 8125-8126.

close crab, halibut, shark and swordfish fisheries; duties to conduct research, begin development of a plan, and meet with an advisory committee for market squid. Perhaps the most stunning example of the tri-partite management system was the scheme for herring.[24] The legislature delegated regulatory power to the Commission, but directed the Department to meet with stakeholders to discuss the policies and regulations set by the Commission. The statute set some rules about permits, including a complex point system to evaluate experience that would qualify an applicant for a permit, but left it to the Commission to determine who had "experience." The Department had to issue the permits, but in accordance with the legislature's criteria, and within limits on the number of permits set by the Commission. The Commission and the Department both had authority to revoke permits, but some cases for reissuance were mandated in the statute. Some fees were set in the statute, and the Commission was delegated authority to set others. The fishery is managed with substantial data and the plan included a CEQA document. The herring management approach operated for about 20 years with considerable public involvement and recognition, but recent stock declines led the Department to recommend closure in the ocean fishery (see Part 3 "Other Plans").

California fishery management interacts with the federal system in several ways, and the MLMA does not appear to have changed these interactions. Federal laws governing take of marine mammals, sea birds and endangered or threatened species pre-empt state fishery law. California was recently delegated authority under federal law to manage Dungeness crab.[25] Though the state always had management authority for Dungeness crab in state waters and could regulate California fishermen in federal waters in the absence of an FMP, or any fishermen landing crab in California ports, The Department could not regulate fishing activity by fishermen from another state fishing in federal waters off the California coast and landing in another state. California, Oregon and Washington had already agreed to work together for the benefit of the Dungeness crab fishery, but the federal legislation was necessary to enable the three states' managers to control activity at the borders between the states.

Some California species, such as sharks, are covered under federal management plans developed by the Pacific Fishery Management Council. The Department's Director, or his or her designee, is a voting member of the PFMC. State regulations that cover species also managed in federal waters may be stricter than federal rules, but not less stringent. California is part of a multi-state compact that created the Pacific States Marine Fisheries Commission in 1947 as a means to help harmonize regulations governing the harvest of species that occur in waters of California, Oregon, Washington, Idaho and Alaska.[26] The Department's director, a member of the legislature and an individual serve as commissioners. The PSMFC does not have regulatory powers: it serves primarily as a coordinating and funding entity, which fosters activities such as the tri-state Dungeness crab committee, research projects, and maintenance of

[24] Fish and Game Code §§ 8550-8559.

[25] Magnuson-Stevens Reauthorization Act, Pub. L. 109-479, Sec. 302(e) as amended through Jan. 12, 2007.

[26] Pacific States Marine Fisheries Commission Compact. Pub. L. 332, amended by Acts approved October 9, 1962 (Public Law 87-766, 87th Congress, 76 Stat. 763) and July 10, 1970 (Public Law 91-315, 91st Congress, 84 Stat. 415). (California F&G Code Section 14000-14002)

data bases of landings for both recreational and commercial fisheries. (See Section on Science for a list of California projects through the PSFMC)

Restricted access

Restricted access, in various forms, is a complex fishery management tool employed by California prior to and following passage of the MLMA. One challenge in implementing (and understanding) any policy (in this case the MLMA) is that it must be implemented in the context of other policies and other policy tools which plausibly address the same policy objectives. Restricted access policies illustrate these issues as the MLMA is implemented. A background paper on restricted access fisheries, including application of limited entry and restricted access in California is included at Appendix 1. Subsequent reports will take up evaluation of the use of the two sets of policy tools and possible recommendations for their more effective use singly or together.

Table 2 summarizes the fishery, species and gear types of California fisheries that have some form of restricted access. Some restricted access programs preceded the Commission's 1999 policy or were developed under other authority, as noted in the table.

Since its adoption, the policy has been the topic of Commission discussions at meetings in 2005, 2007, 2008 and currently. Review and adaptation of the policy is listed as a long-term priority on the Commission's policy agenda. There is some discrepancy between the policy and the MLMA about whether restricted access programs are to be reviewed every four years or every five years. There also have been problems with inconsistent standards for inclusion in limited entry fisheries between the Commission's policy on permits (Section 5) and the statutory requirement for inclusion of licensed fishermen in limited entry programs (Code Section 8101-8104). This conflict arose in the market squid fishery FMP, for example. A review of the restricted access provisions of the Dungeness crab program in 2002 found that it was only partially consistent with the Commission's policy and failed to limit the number of traps used in the fishery, therefore not achieving any actual reduction in effort.

TABLE 2. Restricted Access Commercial Fisheries

Fishery	Species	Gear	Authority	Restriction/Date
Salmon	Coho, Chinook, pink salmon	Troll, gillnet	Legislature; PFMC FMP	Limited entry permit (1983)
Herring	Pacific herring, sac roe	Gill net	Commission	Sac-roe fishery is limited entry (1973-1974)
Coastal pelagics except squid	Anchovy, sardine, smelt, mackerel	Purse seine, lampara, brail and dip nets	PFMC	Limited entry (1999) capacity goal (2003)
Nearshore finfish	See NFMP Chapter 2, FGC 8586(a)	Traps, lines	Commission	Restricted access (2002)
Dungeness crab	Dungeness crab	Traps	Legislature	Vessel-based restricted access (1992)
Cucumber	California sea cucumber, warty sea cucumber	Dive	Legislature and Commission	Permit (1992); limited permits (1997-1998)
Lobster	California spiny lobster	Traps	Legislature	Restricted access (1997)
Spot prawn	Spot prawn	Traps	Commission	Restricted access (2002); vessel permit (2004)
Pink shrimp	Pacific ocean shrimp	Trawl	Commission	Limited entry 2001 (northern region)
Urchin	Purple, red sea urchin	Dive	Commission	Restricted access (1989); effort reduction (1990)
Finfish trap	All finfish south of Point Arguello	Trap	Commission	Restricted access (2002)
Highly Migratory species	Highly migratory sharks, swordfish, tuna	Drift gillnet, longline	Legislature, PFMC plan carries forward for these and other gears	Limited entry (2004)
California halibut	California halibut	Gillnet, trawl	Legislature and Commission	Halibut permit program (2006)
Market squid	California squid	Seine, brail and light boats	PFMC/Commission	Restricted access 2005; permit moratorium 1998
Groundfish (not nearshore)	Sablefish, sole, rockfish,	Longline, trawl, set lines, gill and trammel nets	PFMC	Limited entry (1992)

The goals of the authors of the MLMA are adjusted in the legislative process

The drafters of Sea Life Recovery and Management Act wanted to create a framework to address California ocean life management in the broadest sense. They did not set out to create a law focused on fishery management plans. Their broad vision was a statutory umbrella under which managers could tackle all manner of wildlife-fishery conflicts: seabird entanglement in gillnets or sea lion predation of sport boat catches, area management, recovery of depleted species, marine habitat restoration, and ecosystem protection for all marine and tidal areas. The Legislative Counsel's digest described the measure as follows:

The bill would create the Marine Life Management Commission and would delegate to that commission the authority to determine and declare, by regulation, state policy on marine ecosystems, anadromous fisheries and their habitat, and ecosystems, marine mammals, birds, fish, invertebrates, and other wildlife and their habitats in the coastal zone and all marine and tidal waters of the state.[27]

The proposed legislation was a response to a shift in public opinion and the political balance among stakeholders. California's commercial landings, and the related influence of industry in the Legislature, were declining during the mid-1990s, while the influence of recreational anglers and conservation advocates was on the rise.

Author and new Assemblyman Fred Keeley also wanted to get away from legislative micromanagement of California's commercial fisheries. The accepted practice was that industry representatives went to specific members of the Assembly and Senate committees (Water, Parks, and Wildlife or Natural Resources in the Assembly, Natural Resources and Wildlife in the Senate) with requests for "fixes" for their respective fisheries. The case-by-case legislative responses were not consistent in their requirements for information or management approach. In comments to the Assembly Committee on Water, Parks and Wildlife, Keeley once called the result "a hodgepodge of complex, inconsistent regulations" that took authority away from the Department and Commission.[28]

A practical problem with this way of setting fishery policies was that the need to adopt in-season management adjustments did not follow the legislative calendar. Additionally, term limits (taking effect after the 1996 election) nearly eliminated the institutional knowledge of fishery management from key committees in the 1997-1998 sessions. Departing legislators of 20 or 30 years took with them knowledge of the fishing ports, the key participants including commercial and recreational fishers, fishing-related businesses, and environmental and conservation advocates; new legislators lacked this knowledge.[29]

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[27] AB No. 1241, Feb. 28, 1997.

[28] Hearing analysis for Assembly Committee on Water, Parks & Wildlife, concurrence in Senate amendments, 8/27/98

[29] A dramatic illustration of the consequences surfaced when the Department and Commission recognized that abalone was in serious trouble in 1997. Managers had to rely on 180-day emergency authority to close recreational and commercial fisheries, but required introduction and passage of a bill in the Legislature to continue the

MLMA drafters drew substantially from the federal SFA [discussed above], including policy tools based on concepts about scientifically based catch limits, halting overfishing, avoiding bycatch and protecting and restoring essential habitat. As introduced, the bill declared a policy of long-term sustainability and conservative management, explicitly calling for application of the precautionary approach to management decisions. It included a three-tiered system[30] of fishery management, based on availability of "essential fishery knowledge," with more risk-adverse management for fisheries with the least information. The measure required the gathering of *Essential Fish Information* to guide the preparation of fishing management plans, prescribed research and observer programs, and defined and prohibited fishing methods that were destructive of sea life. The original measure also called for creation of a "Marine Life Management Commission'" separate from the Fish and Game Commission, with specified representation among the members, significant policy and regulatory authority, and paid staff.

By the time the bill was considered by the Assembly Committee on Water, Parks and Wildlife in 1998 it had been amended considerably.[31] One of the bill managers recalls that there were multiple lists of amendments, negotiations, and changes of words, phrases and entire sections in the course of achieving the compromises required for passage of a bill.

In the final legislation, the proposal for a separate Marine Life Management Commission was pared down to a Marine Committee within the Commission. The definitions of "precautionary approach" and "ecological safeguard" were gone, as was the initial mandate for a three-tiered approach to setting limits based on the availability of data. Legislators also removed the section on "Marine Ecosystems Replenishment Zones," (although in the following year the Legislature passed the Marine Life Protection Act, or MLPA, which called for a network of marine protected areas along California's coast).

The final version of the MLMA detailed procedures by which the Department would gather essential fish information, prepare fishery management plans, and issue regulations, thus providing legislative authority for the Department to set policy and develop management measures to regulate commercial fishing of certain species. In enacting the MLMA, the Legislature agreed to shift decisions about fishery management of selected species to the Commission and Department. The Legislature chose not

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measure. The relevant committees, however, had new members with no history on the issue, no constituent context, and no experience dealing with hearing rooms full of unhappy stakeholders.

[30] "The department, with the advice and concurrence of the commission, shall establish and adopt, by regulation, a program for managing three categories of marine and anadromous fisheries. The first category of fisheries shall be those established fisheries that, with the advice and concurrence of the commission, the department finds meet the criteria of essential fishery knowledge, as defined by the commission. The second category of fisheries shall be those established fisheries that, with the advice and concurrence of the commission, the department finds do not meet the criteria of essential fishery knowledge,. The third category of fisheries shall be all new or developing fisheries." AB 1241 Sec. 72231.

[31] Though the bill was introduced in 1997, and referred to CWPW, it was postponed, and taken up "with author's amendments" in Jan. 1998. Complete bill history, AB 1241.

to transfer all management authority, however; it retained authority for fisheries it had historically regulated.[32]

After hearings and mark-ups in the two Assembly committees and a floor vote, the bill passed to the Senate in late January 1998. From its first hearing, where no opposition was recorded in the legislative analysis, the bill garnered objections from a half dozen industry associations and 13 individuals. The Governor's office opposed the measure "to the eleventh hour" according to legislative observers. The bill managers also note that the Department was on record in opposition to the measure. Also on the supporting side were a dozen conservation and public interest groups, 27 individual scientists and the California Association of Professional Scientists, 50 individuals, anglers, divers, the Pacific Coast Federation of Fishing Associations and every major California newspaper.[33] The Senate Natural Resources, Senate Appropriations and Senate Rules Committees all exercised jurisdiction over the bill and the Senate adopted it in late August. The Assembly concurred in the Senate amendments and the Governor signed the bill on September 30, 1998.

After the legislative negotiations, compromises, amendments and word changes, here is one insider's view of the result: "greater delegation of authority by the Legislature to the Fish and Game Commission and the Department of Fish and Game, the priority of long-term benefits and sustainability over short-term benefits in our use of marine resources, an ecosystem perspective that includes more than fisheries, and a strong emphasis on science-based management developed with the help of those most knowledgeable and concerned about the health of the ocean and our fisheries."[34]

[32] The extent to which policies of the MLMA have been applied to management other than through creation of a FMP will be discussed in the next report.

[33] Legislative counsel analysis; San Diego Earth Times (1998); see, e.g. Sacramento Bee, "Victory at Sea," Sept. 17, 1998.

[34] Assembly Member Fred Keeley, letter covering publication of Guide to the MLMA. It is worth noting that these comments do not emphasize simplification or reduction of management complexity.

Part 2: How the MLMA Changed Fishery Management

The MLMA specified in language several fundamental elements of fishery management : it explicitly declared that the purpose of management was sustainability;[35] it increased authority in the Department and Commission; it described specific tools and policies that bolstered the scientific basis for decision-making; it made fishery management plans the primary tool for management; and it prescribed a planning process that emphasized constituent involvement. However, the Legislature remained deeply involved in fisheries policies. Notably, responsibilities shifted to the Commission included only fisheries where the Legislature had not yet developed policies. As seen in Table 3, one of the highest value fisheries, market squid, is managed under an FMP, while another, Dungeness crab is not managed by the Commission under a plan, but by the Legislature with statutory measures.[36] Of the other high value species, none is included in an FMP developed by the state, though several are in FMPs developed by the PFMC and the Department reportedly is considering development of an FMP for lobster.

[35] The mission statements of the Department and the Commission are slightly different. The mission of the Department of Fish and Game is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and ***for their use*** and enjoyment by the public. (1990-2009) The Mission of the California Fish and Game Commission is, on behalf of California citizens, to ensure the ***long term sustainability*** of California's fish and wildlife resources. (1998) Emphasis added.

[36] In fact, the Legislature recently directed formation of a Dungeness crab task force by the Ocean Protection Council. This initiative reportedly is on hold due to California's budget crisis.

Table 3. Top Ten California Fisheries for 2007 and Policy Responsibility

Rank	LANDING WEIGHT		LANDED VALUE	
	Species	Pounds	Species	Landed Value
1	Sardine, Pacific	178,480,103	**SQUID, CA MARKET**	$29,093,312
2	**SQUID, CA MARKET**	108,990,594	***Crab, Dungeness***	$26,892,110
3	Anchovy, Northern	22,901,916	Sardine, Pacific	$8,218,158
4	**Sea Urchins**	11,131,171	Salmon, Chinook	$7,835,240
5	Mackerel, Chub	11,060,845	**Lobster, CA Spiny**	$6,915,601
6	***Crab, Dungeness***	11,024,395	**Sea Urchins**	$5,400,279
7	Sole, Dover	6,100,906	Sablefish	$4,872,745
8	Hake, Pacific (Whiting)	5,888,062	Swordfish	$3,126,635
9	Sablefish	3,240,434	**Prawn, Spot**	$2,879,716
10	Sole, Petrale	2,019,594	Sole, Dover	$2,376,031

Species for which the F&G Commission shares management with the Pacific Fishery Management Council.

Species managed solely by the California Legislature.

Species the F&G Commission manages.

SPECIES THE F&G COMMISSION MANAGES WITH FMPS DEVELOPED UNDER THE MLMA.

Source: National Ocean Economics Program, http://noep.mbari.org/LMR/topTenResults.asp?selRegions=PF&selStates=6&selYears=2007&selOut=display&noepID=unknown

MLMA provisions and policies

The MLMA contains findings, policy statements, objectives, mandates, and both optional and prescriptive tools and procedures, all of which incorporate the idea of sustainability. At the core, and the driver for each of these elements, is the overarching policy of conservation, sustainable use, "and, where feasible, restoration of California's marine living resources for the benefit of all the citizens of the state."[37] The word "sustainable" is used 16 times in the 10 sections of the MLMA. This is a distinction from the prior management paradigm that emphasized management for use and accommodation of the needs of user groups according to interviews for this report. (Before its repeal by MLMA, § 1701 of the Fish and Game Code directed managers to "conserve, utilize and manage" marine resources and promote commercial fisheries.) In a strategic plan published in 2000, the manager of the Marine Region described the new policies and directions mapped by the MLMA as "the most significant changes to management of California's ocean resources in 50 years."

[37] §7050(b).

The stated objectives of the MLMA's sustainable use policy are:

- conserve ecosystems and marine resources,
- allow and encourage only sustainable activities,
- recognize non-consumptive values as well as the economic value of marine resources.
- support and promote scientific research,
- use best scientific information available or other information that can be obtained without delaying plan preparation,
- engage all stakeholders,
- promote education and information on the status of resources, and
- foster regional and international cooperation.[38]

Box 4. Precautionary Approach

"The precautionary approach implements conservation measures even in the absence of scientific certainty that fish stocks are being overexploited. In a fisheries context, the precautionary approach is receiving considerable attention throughout the world primarily because the collapse of many fishery resources is perceived to be due to the inability to implement timely conservation measures without scientific proof of overfishing."

NOAA Technical Memorandum NMFS-F/SPO-## July 17, 1998

The law requires that marine fisheries be managed to maintain the long-term sustainability of the resource and fishing communities by adhering to maximum sustainable yield, conservation and restoration of habitat, rebuilding depressed (overfished) stocks, and limitation of bycatch. It also describes a fishery management system that employs best available science, an open decision making process, and a fair means for dispute resolution; is responsive and adaptive to new information and changing conditions; and is reviewed periodically for effectiveness. The system is to reflect awareness of the long-term interests of user groups. The law does not require, but does provide guidance and options, for the Department to allow or encourage fishery participants to determine methods to reduce excess capacity, participate in research, and propose collaborative approaches to management.[39] Fishery regulations are to conform to the stated policies.[40]

In addition to changing the purpose of fishery management, the MLMA changed the structure and process of management. The MLMA transferred permanent management authority to the Commission for the nearshore finfish fishery, the white seabass fishery, emerging fisheries, and other fisheries for which the Commission had some management authority prior to January 1, 1999. The law required the Commission to form a Marine Resources Committee. The legislative analysis for the Senate Natural Resources Committee describes a "new balance of authorities" that increases authority for the Commission and Department, taking the details of management out of the Legislature while retaining "a signifi-

[38] §7050(b) (1) - (9).
[39] §7055, §7056 (a) - (m).
[40] §7058.

cant amount of Legislative oversight."[41] Authors of the legislation agreed in interviews that the purpose was to give more authority to the Department and Commission, but with detailed guidelines written into the law to be sure both entities followed the desired process. The Senate analysis describes comprehensive decision guidance from the Legislature: "The bill lays out a series of checks and balances between the Department and the Commission tempered by comments from independent peer reviewers."

The MLMA also shifts the burden of proof from the Department to users by repealing the section of the Fish and Game Code that authorized unrestricted take of commercial fish for which no seasons or restrictions on commercial take are prohibited.[42] In other words, the new law created a default position in favor of protecting the resource from commercial activity until management measures for sustainable use could be adopted, whereas the prior approach was to allow any species to be harvested until the Department could show there was a reason to restrict that harvest. Interviews for this report describe this variously as a shift in the management paradigm. It reflected debate on the national and international scene about application of the precautionary principle to fishery management, defined in Box 4.[43]

The definition of "precautionary approach" and the specific requirement to use it were deleted from the MLMA in Senate amendments. Proponents of a strong interpretation of the MLMA argue that provisions calling for management by MSY, best available science, prevention of overfishing and rebuilding of depressed stocks, adaptive management, improved science and the extensive requirements for building a foundation of fishery information all point to an approach that embodies the precautionary principle. Evidence that this approach influences the Department is seen in the strategic plan adopted by the Marine Region after passage of the MLMA which includes the following strategy as a means to achieve the objective to improve management response and effectiveness: "Shift the 'burden of proof' from the management agencies to the fisheries. Develop a more precautionary approach to fishery management."[44]

The point of the precautionary approach is to manage with or without information, the latter requiring more risk-averse decision making. The role of fishery information—its acquisition, quality, application and dissemination—received considerable attention in the MLMA. The Act requires decision-making using the best available scientific and other relevant information. "Other" essential fishery information listed in the law includes "information about fish life history and habitat requirements; the status and trends of fish populations, fishing effort, and catch levels; fishery effects on fish age structure and on other marine living resources and users, and any other information related to the biology of a fish species or to taking in the fishery that is necessary to permit fisheries to be managed."[45] The first

[41] California Senate Natural Resources and Wildlife Committee, Bill Analysis, June 23, 1998.
[42] AB 1241, Senate Bill analysis.
[43] *See, e.g.,* Guide to MLMA at 17; Congressional Research Service 2005; Restrepo et al 1998.
[44] Marine Region Strategic Plan, Goal #3, at 36.
[45] Fish and Game Code, Ch. 2, Sec. 93; MLMA Ch. 2. Marine Life Definitions.

plank in the information platform was to be an annual report on the status of California's sport and commercial fisheries. Each report was to cover one-fourth of the fisheries so that information on every fishery was updated every four years. (§7065)

The MLMA requires that scientific information undergo peer review and provides options and tools for implementing that review. (§7062) The Department is to conduct and support research and encourage the participation of fishermen in the design of projects and collection of information. (§7060(c)) The Act also calls for preparation of research protocols for fisheries identified as highest priority. (§7074)

Fishery management plans [FMPs] are the primary basis for managing California's sport and commercial fisheries under the MLMA. (§7070) The MLMA requires that FMPs:

- be based on the best available scientific information,
- fairly allocate increases or restrictions on harvest,
- be developed with advice and assistance from fishery participants and other fishery institutions,
- undergo peer review,
- be available for public comment,
- be submitted to the Legislature for review if they would make inoperative a statute, and
- be accompanied by necessary regulations that are adopted in accordance with the Administrative Procedure Act.

The MLMA exempts FMP regulations from review under CEQA.

The law also calls for a template, a Master Plan, to be prepared by the Department and submitted to the Commission for approval. This Master Plan was to reflect science, constituent advice, and review, and was to set priorities for management, research, monitoring, and review. (§7073)

The contents of FMPs are also specified in some detail:

- a summary of available essential fishery information,
- a research protocol that describes monitoring and data needs,
- conservation and management measures,
- measures to reduce adverse effects on habitat,
- bycatch information and conservation and management measures to reduce bycatch,
- criteria to determine when a fishery is overfished and measures to address overfishing and rebuild the fishery, and
- procedures for review and amendment. (§7080)

An observer notes that the extensive detail on the contents and procedures for plan development were included to be sure that the intent of the provision as conceived by its proponents left little room for interpretation in how it was implemented.[46]

Only two plans were required to be prepared by a time specified in the Act: white seabass and nearshore fishery (§7072(d)).[47] The Department may contract for preparation of plans (§7075(b)). The Commission is to review and approve plans developed by the Department (§7075(a)), and to adopt regulations needed to implement those plans. The Commission is directed to hold at least two public hearings and to act on each plan or plan amendment within 60 days of receipt from the Department and to adopt accompanying regulations within 60 days of plan approval (§7078). The Department is also directed to specify types of regulations it could adopt without a plan amendment.

The last major tool in the MLMA that distinguishes the changed management paradigm is the emphasis on the role of constituents and detailed direction on how the Department and Commission are to engage stakeholders—fishermen, conservationists, scientists and others—in collaborative approaches to management. Section 7059 elaborates that the collaborative process will benefit science, decision-making, research, and development of plans and management measures. It encourages that meetings be located where the most stakeholders can be reached, and calls for improved communication, collaboration and dispute resolution and consideration of forms of co-management. The Department and Commission are to consider gear sectors, areas where fisheries occur, and both sport and commercial interests. The management system is to be open and inclusive of the advice and assistance of interested parties, including consideration of local knowledge. (§7056(h)) A reasonability standard for dealing with constituents is one of the measures of the effectiveness of fishery management. (§7056(m)) According to the Guide, the constituent involvement standards would also apply to adoption of regulations in fisheries that are not among the required FMPs, e.g. emerging fisheries.[48]

The MLMA is codified within the Fish and Game Code and existing provisions (that were not repealed by MLMA) are applicable. Fisheries that were regulated by the Legislature prior to 1999 are not covered by the MLMA. Gear types specified in the Fish and Game Code are the only types that may be used, and all previous requirements for licenses, permits and fees remain in force. Fisheries that were designated as limited entry (discussed above) remain in that status. Conformance with federal fishery management plans remains the purview of the Department's Director, as does authority to promulgate regulations to conform to federal rules. Rules on administrative procedure apply to regulatory proceed-

[46] The impacts of this level of legislative detail on MLMA implementation will be examined in future reports. This examination will extend to other aspects of the MLMA such as requirements for constituent involvement in policy development [see below].

[47] The Squid FMP in Fish and Game Code § 8425(b) was required by SB 201 (Stats. 2001, ch. 318).

[48] Guide, page 21 "The Legislature recognized the special place of emerging fisheries in the MLMA by calling for the Commission to "encourage, manage, and regulate" emerging fisheries using the policies of the MLMA [7090(a)]." In addition, the statute calls for compliance with FMP requirements (7090(e)).

ings under MLMA as with any regulatory action by the Commission or Department. Existing law makes a violation of the requirements, prohibitions and regulations adopted under MLMA a crime.

Table 4 reports analysis of completed management plans compared to the required contents of fishery management plans laid out in the MLMA.

Table 4. MLMA Requirements Addressed by Management Plans

Plan	§7080 (fishery description)	§7081 (research)	§7082/§7083 (conservation)	§7084 (habitat)	§7085 (bycatch)	§7086 (overfishing criteria)
Herring	X	X	x			
White seabass FMP	X	X	x	x	x	x
Near-shore FMP	X	X	x	x	x	x
Squid FMP	X	X	x			
Abalone Recovery and Management Plan	X	x	x	x		x

Expectations for the MLMA vary widely

The changes in legislative language from the initial Sea Life Recovery and Management Act to what was signed as the MLMA [discussed above] seeded differing expectations about its implementation. A key example is seen in the deletion of explicit language on use of the precautionary principle in policy making. Many of the steps which could support use of that policy rule remain in the Act but the statute as adopted contains no explicit reference to the precautionary rule. Metaphorically, the "building blocks" remain, but with no legislative requirement of or guidance for their use.

Based on interviews for this draft report, there is disagreement about whether the MLMA as enacted is closer to a set of management mandates or a broad management philosophy. According to *The Guide to the MLMA*, there are two sets of policies set forth in the MLMA: general policies applicable

to all marine life managed by the state, and general policies applicable to fishery management. In the fishery management general policies, there are both mandatory and discretionary elements for achieving them and also specific tools to be applied. According to authors of the *Guide*, "the policy statements provide the basis for much of what is in the bill and much of what is in the bill cannot be understood or implemented effectively if it is not grounded in those policy statements."[49] The scope of MLMA is defined in Section 7051: regulations shall apply only to ocean waters and bays, and the policies apply only to plans and regulations adopted after January 1999.

The Fish and Game Code states that "Unless the provisions or the context otherwise requires, the definitions in this chapter govern the construction of this code and all regulations adopted under this code," FGC § 2. The Code further states that "Shall" is mandatory and "may" is permissive," FGC § 79. With regard to general marine fishery policies, the MLMA uses "shall" in these contexts:

- management in accordance with the policies of 7055,
- preventing overfishing and rebuilding depressed stocks,
- maintaining sufficient resources to support recreational use,
- encouraging growth of commercial fisheries,
- managing fisheries according to specified objectives,
- taking action to engage stakeholders,
- obtaining essential fishery information,
- establishing a scientific peer review program,
- reporting annually on status of stocks,
- identifying fisheries that do not meet the sustainability policies,
- using FMPs as the primary basis for management,
- basing FMPs on the best available scientific information,
- allocating increases or decreases in catch fairly among participants,
- adopting a master plan, a white seabass FMP and a nearshore FMP by specified dates,
- preparing FMPs that satisfy procedural and substantive requirements,[50]
- encouraging, managing and regulating emerging fisheries,
- preparing fishery research protocols for three priority fisheries, and
- adopting criteria for exempting protocols and plans from peer review.

[49] Weber & Heneman comments on MLMA Lessons Learned Issues Draft for public comment, 2 April 2009.
[50] These include: ensuring FMPs include conservation and management measures that will result in sustainability, overfishing criteria, prevent or end overfishing, protect habitat, minimize bycatch and include procedures for review and amendment

While proponents of a strong interpretation of the MLMA argue that stated policies are directory, there are no statutory consequences or obvious grounds for citizen action if the Department's approach departs from those policies. One observer noted that if the Department developed a plan or the Commission passed a regulation that was "grossly" inconsistent there might be a basis to challenge it in court. A legislative analysis of MLMA points out that legislative oversight remains available, with the potential for oversight hearings to address "shortcomings with regard to implementing legislative mandates." In contrast, the federal Endangered Species Act allows non-governmental parties to petition for listing of species and challenge governmental actions, or failures to act, in court.

Proponents of a strong interpretation of the MLMA further argue that the entirety of the legislative history, not just the "mays" and "shalls" in the statue, argues for a policy interpretation rather than a legalistic one. The purpose of introducing the MLMA was to cause a major change in the way California managed its resources, a change in "the why, the what, the how and the who." *Why* changed from use to *sustainable* use; *what* changed from only those marine resources that managers could prove needed stewardship to *all marine resources and the system that supports them; how* changed from legislation to *scientifically-based plans* and *collaboratively, transparently developed* management measures; and *who* changed from primarily the Legislature and small constituencies to the Department, the Commission and *intentionally engaged* scientists and stakeholders. The policy statements in the MLMA, the directives to produce specific milestones and products, and the requirements for the process to produce them are of a piece and arguably required in order to give the MLMA meaning despite the absence of clear consequences.

Effective policy implementation depends on specific requirements, powers conferred, resources available, and remedies provided. The changes in legislative language as the MLMA was enacted resulted in a statute with limited explicit requirements, limited powers, no continuing provision of resources, and no remedies for failure to act. While the intent of the original AB 1241 could understandably be characterized as dramatically changing policies on use of California ocean resources, the MLMA as enacted was narrower in its aspirations. At least as importantly, some of the provisions of AB 1241 intended to achieve more effective policy making, such as establishing a "Marine Life Management Commission" with significant regulatory authority, were removed and/or weakened before passage of the bill.

As enacted, the tools the Department may use to meet the goals of MLMA are, at least arguably, discretionary. The MLMA provides discretion to the Department in how it conducts collaborative science, designs dispute resolution, promotes co-management, secures peer review, develops FMPs, identifies non-fishing sources of depressed fisheries, evaluates the management system, specifies measures to achieve sustainability, chooses the form to manage emerging fisheries, and imposes fees. Additional flexibility has been provided by amendments to the statute that extended deadlines for completion of mandatory elements.

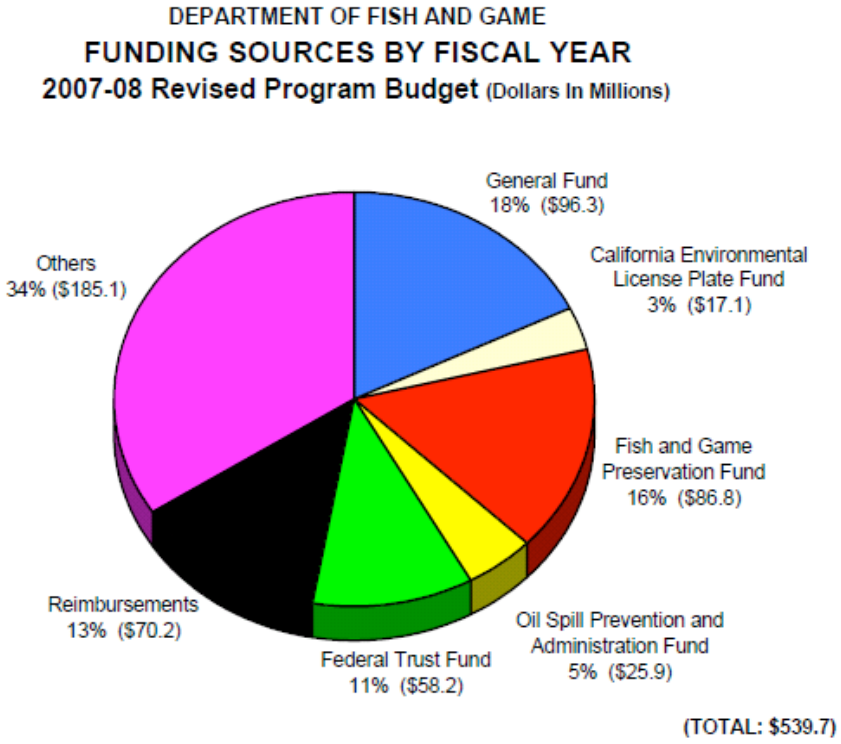
Part 3 of this report examines how the Department and the Commission have implemented the MLMA, including development of specified FMPs, and how policies and procedures in the MLMA have been employed to develop those plans or inform the promulgation of regulations and management measures in other frameworks.

Limited state appropriated resources for implementing the MLMA

The responsibility for implementing the MLMA lies with the Marine Region of the Department. The size and character of financial and human resources available to the Department generally, and the Marine Region specifically, are important to understanding implementation of the MLMA. The Department receives less than one fifth of its budget from the state General Fund, as shown in Figure 2.[51] The largest category of funds, "other," is mostly bond funds and the third largest, "Fish and Game Preservation Fund," includes sport fishing and hunting and commercial fishing license revenues and a number of dedicated funds. Examples of marine-related dedicated funds include user stamp fees to fund marine fish species research and recreational abalone management. The 2007-08 budget of the Department was a 23 percent increase over its 2006-07 budget, mostly attributable to an infusion of bond funds, plus increased fees and reimbursements, as general fund appropriations declined. For 2008-09, the general fund appropriations declined further and allocation from bond funds fell back to 2005-06 levels, resulting in a 26 percent decline in total revenues from 2006-07 and a 9 percent decline from 2005-06. Overall, the finances of the Department are characterized by limited General Fund support, reliance on fees, and reimbursements and allocations from bond funds, resulting in considerable volatility in available funds.

[51] . Department, *Budget Fact Book*. January 10, 2008

Figure 2. Department of Fish and Game Funding Sources, 2007-08



It is important to note that the commercial fishery management duties of the Department, though historically important, are just one part of the responsibilities in the Marine Region, which also has pollution prevention and other responsibilities. The Marine Region is in turn just one unit in the Department, which has an even larger mission. For comparison purposes, in FY2007-08, the program segment containing fishery management (Hunting, Fishing and Public Use) was 14 percent of the Department's overall budget. Within that program, management of commercial fisheries represented about a fourth of the program funding requirements.

With passage of the MLMA and its increased authority came increased resources, at least in the beginning. For the first time, the Marine Region received a general fund appropriation in budget year 1999-2000. Commercial fishing programs, according to the Fish and Game Code, were to be financed with revenues they generated.[52] Heretofore, the source of money for the Marine Region was from commercial fishing licenses, taxes on commercial landings, and permit fees. Recreational fishing programs were likewise funded by their own revenues, except for free sport fishing licenses, which were supported with general funds. Federal sources such as the Federal Aid In Sport Fish Restoration Act of 1950 (Dingell-Johnson Act) and the Interjurisdictional Fisheries Act of 1986 provided additional revenues for specific activities or as reimbursements. The 1999-2000 appropriation was specifically designated for implementation of the Marine Life Management Act [need copy of finance letter or source for this

[52] §711

statement other than Guide to MLMA]. This boost enabled the Marine Region to hire xx additional staff to meet the requirements of MLMA.

Table 5 shows the budget for the Marine Region from 1999 to 2008, both in appropriation amount and positions. Staff explains that the Department's budget process does not give a means to tease apart amounts devoted to each implementation task or specific activity, so it is unclear whether budget requests from the Department or appropriations by the Legislature accounted for the additional costs of doing the increased science, constituent engagement and fishery management planning required by MLMA. Persons interviewed for this report observe that $4 to $6 million in additional general funds came to the Marine Region from 1999 to 2002.

Table 5. Department Marine Region positions and budget received, 1999-2006[53]

Fiscal Year	Positions	Total Allotment
1999-2000	203.5	21,340,494
2000-2001	213.5	25,118,538
2001-2002	213.5	24,281,973
2002-2003	197.5	20,729,393
2003-2004	173.5	18,924,488
2004-2005	116.5	15,665,395
2005-2006 2006-2007 2007-2008 2008-2009	114.7	14,820,977

Several things occurred following MLMA passage to limit the resources available for implementation. The legislature passed MLPA a year later, and the job of its implementation also resided in the Marine Region. Overall state revenue fell in 2002, and tight budgets for several years meant that the Department, like other agencies, had to relinquish general fund sources and reduce positions in the Marine Region. Consistent with common budgeting practices, including those of California, once general fund appropriations are reduced the Marine Region does not get the money restored without a specific

[53] *NOTE: This table is taken from the MLPA LL Report for the Central Coast. The data were provided by the Department. The LLT is working with the Department to provide updated information.*

new appropriation.[54] The Legislature approved additional appropriations in 2006-2007; the extent to which these appropriations were directed to a specific program by the Legislature, as opposed to being made available to the Department for discretionary use in both MLPA and MLMA, is not clear at this time.[55] Additionally, the appropriations can be provided without an authorization to hire staff ("PYs"), making it challenging to develop the expertise and relationships needed for effective policy implementation.

Limited private and federal funding also supported the initial MLMA implementation efforts. Commonweal, a nonprofit organization, provided support for consultants who worked with the Department or Commission on restricted access polices, the Nearshore FMP, the Nearshore control rule, Nearshore science plan, the initial status review, master plan and the Guide to the MLMA.[56] A multi-year project to assist the Commission and Department with implementation of some elements of MLMA provided funding for policy staff for the Commission (1999-2003), public process consultants for the Department, and contributed scientific, technical and editing support for production of *California Living Marine Resources: A Status Report*, and production and distribution of a *Guide to California's Marine Life Management Act*. The consultants reported to either the Commission or to the Department.[57]

It is evident from the overall appropriation history for the Marine Region displayed in Table 5 that despite the investments made immediately following passage of MLMA and MLPA, available staff and resources to do the work decreased in subsequent years. [58]

[54] Interviews with Marine Region staff.

[55] The legislature also appropriated funds for use by OPC to support some aspects of MLPA/MLMA implementation. **NOTE: Details of this action require clarification with DFG and OPC.**

[56] Total funding from January 1999 through December 2002 was $350,516, under grants from the David and Lucille Packard Foundation, Marisla Foundation and Pew Fellows Program in Marine Conservation. Information about Commonweal is available online at http://www.commonweal.org/programs/ocean-policy.html.

[57] These activities were supported by a grant totaling $503,823 through the National Fish and Wildlife Foundation, with funding from the National Oceanic and Atmospheric Administration, the David and Lucille Packard Foundation, and the Jennifer Altman Foundation.

[58] While the overall trend of declining appropriations to the Department for marine purposes is clear, information about any legislative allocations to specific programs, such as the MLMA, is not as easily obtained in public records. Additionally, the legislature also appropriated funds to the Ocean Protection Council to support marine programs, further complicating analysis.

Part 3: Implementation of the MLMA

This part describes efforts to implement the MLMA over the past 10 years. Key deliverables, such as mandated Status Reports and FMPs, are the organizing principle. At the same time, this description of MLMA implementation seeks to do justice to less visible resource commitments, actions, and outcomes. This part is descriptive and not evaluative by design; it is intended to establish most of the factual foundation for the second report for this project that will have evaluation as its focus.

The MLMA gives direction on both content and procedure for developing FMPs and other management measures. Two building blocks for development of fishery management plans and management measures are the report on the status of commercial and recreational fisheries of the state, and a Master Plan "that specifies the process and the resources needed to prepare, adopt, and implement fishery management plans for sport and commercial marine fisheries managed by the state."[59] The Status of Fisheries report is the intended vehicle for compiling the "essential fishery information" needed to develop a FMP.

Status report

The first status report was published in December 2001, shortly past the September 2001 deadline in the statute. An annual update was completed in 2003, and another update in 2006. The first report is a comprehensive compilation of available fishery information as well as information on other marine life such as marine mammals and seabirds. It is organized on an ecosystem basis rather than species by species (though species information also is provided), and it includes information on the human system dimension such as socio-economic information on communities, trade, landings, recreational fishing and effort. The status report was compiled collaboratively with partners from other agencies, academic institutions and organizations in an open, iterative, adaptive process, and was extensively peer reviewed[60] The report tracks the three requirements of MLMA Section 7066: (1) it identifies fisheries that do not meet the sustainability policies of MLMA; (2) it reviews restricted access programs; and (3) it evaluates the management system and makes recommendations on a fishery-by-fishery basis.[61] The second status report, published in December 2004, reviewed updates through 2003. It built on the first report and focused on developing groups of species to be reviewed on a rolling schedule, with criteria for how review topics would be chosen. The review covers 14 species[62], an overview of human use and

[59] §7073 (a)
[60] See comments by editors in Introduction, pp. 19-20.
[61] The authors of the report state that the views are not necessarily those of the Department or the Commission, but provide recommendations from procedural advice to scientific requirements to management measures to observations about market and catch trends. Appendix A, pp. 553 to 555.
[62] Giant kelp, bull kelp, sea palm, California spiny lobster, rock crabs, Dungeness crab, sheep crab, abalones, red sea urchin, purple sea urchin, sea basses, ocean whitefish, surfperches, California halibut.

harvest, biological characteristics of target species, status of the population with regard to MLMA sustainability goals, and a description of current management activities. In addition to Department contributors, the report acknowledges work from University of California, Santa Barbara; Humboldt State University, and California Sea Grant. The most recent status report was published in June 2008, and provides an updated review of an additional 15 species.[63] The latest report incorporates more fishery-independent data[64] than prior reports, and adds additional economic information. All status reports are available on the Marine Region website [http://www.dfg.ca.gov/marine/].

Master Plan

The MLMA called for submission to the Commission of a Master Plan by September 1, 2001. Box 5 provides the language of the MLMA that specifies what was to be in the Master Plan. The Master Plan was developed by a team of Marine Region staff with assistance from Commission consultants, beginning in April 2000.[65] A constituent involvement team of department staff and consultants provided advice and review. The master plan team tapped expertise from other working groups assembled to develop the Nearshore FMP, the Status of Fisheries Report, and peer review team. An ambitious timetable called for

Box 5. MLMA §7073 Master Plan

(b) The master plan shall include all of the following:

(1) A list identifying the fisheries managed by the state, with individual fisheries assigned to fishery management plans as determined by the department according to conservation and management needs and consistent with subdivision (g) of Section 7056.

(2) A priority list for preparation of fishery management plans. Highest priority shall be given to fisheries that the department determines have the greatest need for changes in conservation and management measures in order to comply with the policies and requirements set forth in this part. Fisheries for which the department determines that current management complies with the policies and requirements of this part shall be given the lowest priority.

(3) A description of the research, monitoring, and data collection activities that the department conducts for marine fisheries and of any additional activities that might be needed for the department to acquire essential fishery information, with emphasis on the higher priority fisheries identified pursuant to paragraph (2).

(4) A process consistent with Section 7059 that ensures the opportunity for meaningful involvement in the development of fishery management plans and research plan by fishery participants and their representatives, marine scientists, and other interested parties.

(5) A process for periodic review and amendment of the master plan.

[63] Market squid, spot prawn, pink shrimp, ridgeback prawn, sea cucumber, pismo clam, cabezon, California Scorpionfish, gopher rockfish, kelp greenling, Pacific herring, Pacific salmon, white seabass, leopard shark, shortfin mako shark.

[64] There are two types of fisheries data collected by state and federal managers: fishery independent and fishery-dependent data. Fishery-independent data are obtained through activities such as stock assessment surveys and research conducted by federal, state, and university scientists. Fishery-dependent data are gathered from fishermen and processors through log books, trip tickets, and landing bills or collected by state and federal agencies through dockside contacts with both commercial and recreational fishermen, through telephone surveys that relate to recreational fishing activities (e.g., Marine Recreational Fisheries Statistical Survey), through mailed, e-mailed or telephone surveys that gather socio-economic information, and through observer programs that provide detailed commercial catch, effort, and bycatch data. National Academy of Science.

[65] As noted earlier in this report, Commission staff providing this support were funded through private sources.

completion of a draft for public comment by late January 2001.

The master plan team compiled definitions to policy statements, lists of fisheries, criteria for assessing what fisheries should come under plans, a format for plans, and other elements. They examined FMP examples from other states and CEQA formats, and debated tradeoffs involving single and multi-species plans. An MLMA Evaluation Advisory Committee appointed by the Director to assess many aspects of implementation spent at least one meeting commenting on Master Plan draft documents. A draft of the Master Plan was circulated for review from February 1 to March 7, 2001, revised to include public comments and presented to the Fish and Game Commission at its August 2001 meeting. Director Robert Hight at the time called the Master Plan and Status Report "significant steps in implementing the MLMA."[66]

The adopted document was finalized in December 2001, and included information on ecosystem approaches to fishery management, detailed instructions on preparation, contents and adoption of FMPs, a review of possible costs and a proposed process for developing guidance. The Master Plan discusses how managers are to address MLMA topics and issues such as bycatch and non-consumptive uses and provides a protocol for setting priorities among fisheries to be managed through plans. The Master Plan ranks sea urchins, California halibut, and nearshore sharks and rays as the species or species groups most in need of management plans based on explicit criteria and review of public comment. The Master Plan also defines essential fishery information and lays out a system for using, collecting, and setting priorities for acquiring essential fishery information. Detailed instructions, advice and examples for engaging constituents and conducting peer review are part of the document, along with appendices on dispute resolution and public involvement.

The Master Plan was to be reviewed four years after adoption and every four years thereafter[67], or more frequently to consider revisions based on significant changes or petitions from the public to change the priority of fisheries being considered for management plans. Some observers have suggested that the Master Plan was not completed soon enough to shape development of the nearshore FMP, as that effort was occurring simultaneously. Others have suggested that the Master Plan should be revised as guidance or rewritten to provide specific steps, chronology and content rather than discussion. Numerous views on options for revising the Master Plan were captured in consultant-led debriefings and evaluations conducted with Marine Region staff, advisory group members, plan team participants and peer reviewers.[68] The Department reportedly has taken steps internally to revise the Master Plan, including modifications to the list of priority species for developing additional FMPs, but no revision has been presented to the Commission.

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[66] Marine Management News, Sept. 2001. Available online at http://www.dfg.ca.gov/marine/newsletter/0901.asp#milestones

[67] Master Plan, Section 7.2.

[68] Debriefing document on Nearshore FMP, p. 29. Undated hard copy provided by Department.

White seabass plan

The MLMA specified completion of FMPs for white seabass and nearshore fish species. Early versions of the legislation posited management plans for every sport and commercial fishery by the end of 2009,[69] but amendments pared this down to white seabass and the nearshore fishery. Earlier legislative action in 1995 had called for a pilot FMP for white seabass to explore whether it was possible to come up with environmental analysis equivalent to the requirements under CEQA. In response, a plan was developed in 1995 through the cooperative efforts of academic and federal fishery scientists, consultants, and fishery constituents, approved by the Commission (without any accompanying regulations) and submitted to the Legislature. The Legislature heard the resulting bill in committee but did not pass it out for further consideration. According to Senate analysis, public and committee member concerns about the adequacy of the analysis in the plan stopped its passage. The concerns were that the analysis in the plan did not achieve "functional equivalency," which under CEQA means that the acting agency has conducted a thorough analysis of the effects of its decision on the environment and natural resources. Because the MLMA provided a very specific list of contents for a FMP, drafters had believed it would measure up to the functional equivalency test, and the Act states that plans prepared under its guidelines are exempt from further analysis under CEQA. At the time the Legislature was considering the MLMA, proponents of the white seabass plan folded that measure into the MLMA required plans, rather than try to pass it as stand-alone legislation.[70]

The white seabass plan prepared in response to the MLMA is a bit of a hybrid, in that it retains a CEQA-style format from the initial draft of the plan, but adds both content and procedures in response to MLMA requirements. In fact, the plan includes an appendix describing where responses to each of the MLMA requirements can be found.[71] The plan has been the object of some criticism by participants in its development for trying to incorporate both these policy approaches in one document.

White seabass are members of the croaker family and migrate between Mexican waters and the Southern California Bight. They are relatively large fish that have historically been an important species for both commercial and recreational fisheries. The 1995 legislation calling for a management plan was enacted because of declines in landings and conflicts between sectors [commercial-recreational] in the 1980s and 1990s. A hatchery program, funding by sport fishing stamp revenues, was begun in the 1980s to enhance the white seabass population and conduct research, and had released about a half million juveniles by 2000.

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[69] If it had been enacted into law, this wording would possibly have required preparation of a few dozen FMPS. For example, 15 fisheries operate under one or another form of restricted access (Table 2) and 20 are under management by the legislature (Box 3).

[70] Legislative analysis (of AB 1241) for Senate Natural Resources & Wildlife, June 23, 1998.

[71] Appendix H. Location in the Fishery Management Plan of Each Requirement of the Marine Life Management Act. Final White seabass Fishery Management Plan, April 2002.

The white seabass FMP process ramped up constituent involvement and included scientific peer review. New sections setting forth essential fishery information called for by the MLMA added content on information gaps and research protocols. The plan retained its CEQA-like alternatives analysis, but the new alternatives included more options linked to the MLMA, such as a harvest control rule. The plan also identifies "points of concern" that could trigger action to limit catches or otherwise restrict the fishery [Box 6], and includes analysis of the quantity and quality of data about the white seabass fishery and how that affected management choices. Several mechanisms to address socio-economic and allocation concerns are part of the plan, along with criteria for handling allocation, filling information gaps, and conducting annual review of the plan and its management measures. One Department estimate puts the costs of adapting, adopting, and implementing the plan at approximately $1.4 million; no separate estimate of the costs of plan preparation alone has been located.

A major goal of this FMP is acquisition of information to move the fishery from a data-poor to a data-moderate or data-rich status, thereby enabling more data-based catch measures. According to the Marine Region website's summary of the plan, the cost of acquiring this information (research, data collection, monitoring, and analysis) is estimated to be high. Short-term goals include a stock assessment for white seabass using existing and ongoing data sets and new fishery-independent information; determinations of the size at sexual maturity, hooking mortality of released fish, amount of bycatch, and validation of age/growth studies. Long-term research goals include development of more sophisticated stock assessments and models, expansion of hatchery-reared white seabass studies, collection and analyses of more socioeconomic data, cooperative research with Mexico, and implementation of an ecosystem-based management approach.

The key measure in the preferred alternative that was recommended by the plan team included setting optimum yield (OY) at a level determined to allow the population to recover yet permit fishing to continue. The plan team derived the initial OY of 1.2 million pounds by "making a precautionary adjustment" to a proxy for MSY calculated from an estimate of what the population would have been before commercial fishing. Young white seabass and spawning adults are protected through seasonal closures, gear provisions, and size and bag limits. Measures also include several triggers that would alert managers of the potential for overfishing and the need to take action. These "points of concern" (Box 6) have provided a framework for annual review of the fishery by Marine Region staff and an advisory panel consisting of representatives from the scientific community, recreational and commercial fishing industries, and environmental groups. The science advisory panel has reviewed the FMP and fishery

Box 6. White seabass FMP Section -- Points of Concern

1. Expectation OY will be exceeded
2. Changes in biological characteristics of white seabass
3. Overfishing conditions exists or is imminent
4. Significant changes to forage species availability
5. New information on status of white seabass
6. Errors in data or stock assessment

status each year since 2001-2002. The most recent reviews have indicated none of the triggers for action or points of concern have been reached and the population appears—based on the available information—to be recovering.

Nearshore Fishery Management Plan

Whatever their role—manager, observer, advisor, leader, reviewer, or stakeholder—participants in the development of the Nearshore Fishery Management Plan [NFMP] agree that it was complicated, complex, comprehensive, contentious, and time-consuming. A Department estimate puts the "overall costs" of the plan at $10.1 million, although it is not clear what portion of this estimate is attributable solely to plan development. By the time planning began, 124 nearshore species (those found in waters of less than 40 fm depth) had to be evaluated, 19 of which were ultimately included in the plan. Of those species, 14 are included in a federal management plan for groundfish. The nearshore fishery had grown rapidly, without much regulation, since the early 1990s. . The fishery included recreational and commercial sectors with multiple commercial gear types. The NFMP was the first plan to be developed entirely under the rubric of the MLMA and the process exemplified the policies and guidelines of the MLMA . Some argue that the NFMP should be a template for fishery management plans; others contend that it should not be used as an example of planning, organization, or writing. Regardless of characterizations of the effort, the NFMP was completed in 2002. It appears on its face to contain the requisite elements specified in the MLMA, and underwent scientific peer review, extensive public comment, evaluation, and subsequent updating by the Department and Commission.

Box 7. Species in Nearshore Plan and *Federal Groundfish Plan
*Black rockfish Sebastes melanops
*Black-and-yellow rockfish *S. chrysomelas*
*Blue rockfish *S. mystinus*
*Brown rockfish *S. auriculatus*
Cabezon Scorpaenichthys marmoratus
*Calico rockfish *Sebastes dallii*
*California scorpionfish *Scorpaena guttata*
California sheephead Semicossyphus pulcher
*China rockfish Sebastes nebulosus
*Copper rockfish *S. caurinus*
*Gopher rockfish *S. carnatus*
*Grass rockfish S. rastrelliger
Kelp greenling Hexagrammos decagrammus
*Kelp rockfish *S. atrovirens*
Monkeyface prickleback Cebidichthys violaceus
*Olive rockfish *S. serranoides*
*Quillback rockfish *S. maliger*
Rock greenling H. lagocephalus
*Treefish S. serriceps

Species marked with asterisk (*) are managed under federal policies.

History of nearshore management

Prior to enactment of MLMA the Commission managed finfish for the recreational fishery and through delegations by the Legislature for commercial fishing. Management measures passed by the legislature in the years preceding the MLMA included permits, gear restrictions, size limits, time and area closures, quotas, trip limits, and bag limits. State management was coordinated with federal actions taken by the PFMC. As nearshore groundfish fishing activity increased through the 1980s and into the 1990s,

state management became more restrictive, with reductions in allowable commercial catch and recreational bag limits, shorter seasons, and tighter controls on allowable gear. The legislature voted on these measures and the Commission put them into regulations. This regulatory tightening occurred during a period when federal rules also became more restrictive to reduce catches of overfished groundfish populations.[72]

Through 1999, the 14 species now federally recognized as nearshore groundfish (Box 7) were managed by the PFMC as part of a "*Sebastes* (rockfish) complex," not as separate species with species-specific measures such as quotas or trip limits. As the federal Groundfish FMP developed, certain species of groundfish were assessed and managed individually; the remainder of the species, including the nearshore species, continued to be managed as a group. In 2000, the *Sebastes* complex was divided into slope, shelf, and nearshore groups. The 14 actively-managed species were identified as the "nearshore rockfish," and in 2001 the Commission expanded the definition of nearshore finfish to include these species. Beginning in 2000, the PFMC set quotas specifically for the nearshore group, divided among geographical areas and types of permits (limited access gear types, and open access). These quotas did differentiate slightly among species, in that only a portion of the quota could be filled by species other than blue and black rockfish.

California, through the Legislature, Department and Commission, is permitted to regulate fisheries with measures more stringent than those adopted by the PFMC, but which must be at least consistent with federal rules. Appendix F of the NFMP lists tables of regulations affecting nearshore fisheries over time in California, but not whether these regulations were initiated by legislative or Commission action. California's Nearshore Fisheries Management Act (NFMA) which was passed in 1998 but incorporated into the MLMA, granted the Commission additional authority to enact regulations for management of both the recreational and commercial nearshore fisheries to assure the sustainable populations of nearshore fish stocks. The NFMA defined the nearshore fishery and its stocks, declared the need for a management program, set minimum size limits for the commercial take of 10 nearshore species, and authorized the Commission to enact regulations in the nearshore fishery. Some of the regulations affecting both commercial and recreational fisheries were prompted by the determination by federal managers that some groundfish species (such as bocaccio, canary rockfish, yelloweye rockfish, cowcod, and ling cod) were overfished. Others came in response to the emergence of the commercial live-fish fishery for nearshore species in state waters.

The nearshore fishery received significant attention in the Legislature and the MLMA for several reasons. The nearshore zone was a focus of recreational angling from shore, private boats, and charter vessels and of spear fishing by divers through the 1980s and early 1990s. Intensity of fishing varied geographically, but was most concentrated near ports and other points of entry: fishery managers saw some indications of local depletion due to recreational fishing. Although the recreational fishery had

[72] Summarized from Nearshore FMP, Chapter 2, pp. 94-103.

been expanding, it was the development of the nearshore commercial live fish fishery that set the stage for action. This new fishery came about partly in response to the closure of the gill net fishery in the nearshore zone and partly in response to high prices for premium, fresh fish, sold mainly in Asian markets. This fishery grew rapidly, leading to diverse concerns among recreational fishers, fisheries biologists, academics, and environmental advocates.

According to one participant, the growth of the live fish sector "infuriated" some people in the recreational fishery, who had seen the nearshore zone as an area they could easily get to without much expense, and that had not been affected by large-scale offshore fisheries. Because the nearshore zone was familiar to non-extractive users and to marine ecologists who carried out a great deal of research there, the audience of concerned stakeholders expanded beyond historic participants in recreational and commercial fishing. A member of the NFMP development team cites this concern and anger over the virtually unregulated growth of the commercial fishery as the main driver behind the development of the NFMA and the provisions in the MLMA pointed at regulation of emerging fisheries. The collapse of some deeper-water rockfishes and other groundfish and the ever-tightening restrictions in the federal plan were all part of the backdrop to legislative action.

Development of the Nearshore Plan

The MLMA called for a plan regulating nearshore groundfish to be adopted by January 1, 2002, in accordance with the policies and FMP guidelines in the Act, and the NFMA sections laid out some of the specifics of what should be in the plan, including permits, provision for interim measures, size limits penalties and a funding mechanism. The Legislature cited these factors as contributing to the need for action:

- increasing fishing pressure,
- life history characteristics,
- gaps in information on the species and their habitats, and
- lack of a management program.

The Commission and Department laid out a three-stage process for completing the NFMP:

1. Commission action on four proposals: a control date for limited entry, a moratorium on new permits, a petition to allow trap fishing, and gear specifications on traps to avoid marine mammal entanglement,
2. Commission consideration of Department recommendations for size limits, additional species, gear limitations, and area closures, and
3. development and approval for a full fishery management plan.

The NFMP itself was unencumbered by prior legislative or Commission action or processes [because the NFMA was incorporated into the MLMA] and was developed not only on a clean slate, but with considerable resources from the Legislature and the Department, as well as public-private partner-

ships that enabled the Department to receive additional limited assistance.[73] In addition to including the key content elements required by the MLMA *(see below)*, the plan development process reportedly devoted substantial resources to constituent involvement and peer-reviewed, best available science. These efforts are discussed below in detail.

Constituent involvement

Constituent input in the NFMP effectively began with facilitated, small-group conversations in 13 coastal communities in May-June 2000. These meetings provided a venue for Marine Region staff to interact with constituents, discuss the interim regulations, elicit ideas for the management plan, and encourage interested stakeholders to participate. In February 2001, the Department conducted three "scoping" workshops in different locations to present a proposed outline for the NFMP and solicit input on a variety of issues. In that same month, the MLMA Evaluation Advisory Committee reviewed the goals and objectives of the NFMP and offered advice on other issues. In a public meeting in April 2001 the Department presented "issue papers" on approaches to management that had been developed based on interim regulations and input from constituents, and solicited further input.

The Department also convened an Advisory Committee for the Nearshore FMP. The Committee was made up of 37 members and alternates, selected from nominees, representing environmental interests, recreational fishing and diving, commercial fishing, charter boat operators, and academia, each group including representatives from different regions of the state. The Committee met six times with a professional facilitator (smaller subcommittees met or discussed issues separately) between January and September, 2001, usually for two days each time. The Committee heard presentations, reviewed and discussed materials prepared by the Department and identified questions for Department responses at the next meeting. The Committee reworked some sections of the draft FMP, including the problem statement, goals and objectives statement; added some new approaches; and provided a consensus approval of several sections of the FMP. According to a member, the Committee did not reach consensus on several contentious aspects of the plan: harvest control rules, the use of Marine Protected Areas in harvest control rules, and allocation.

The Commission held four meetings for input on the plan and heard public comment at three regular meetings.

Reviews of the constituent and public involvement process offered a range of opinions: some viewed it as the most important aspect of the NFMP process and others characterized it as predetermined and political. Some participants (including Department staff) saw value in using outside, contract facilitators while others did not. The Committee was seen as both helpful and confused. The scientific peer review team noted that it was difficult to determine from the draft FMP how the constituent input was actually employed. Some portions of the NFMP indicate material that was developed or modified

[73] See the discussion of private and federal funding above. See also: *NFMP*, Appendix P. The peer review panel conducted its work with support from UC Davis under contract with the Department.

Box 8. Collaboration with Outside Scientists for Nearshore FMP

-"Assessing and Managing Resident Marine Species;" two-day workshop sponsored by California Sea Grant in June 1999. Academic and non-DFG scientists, for benefit of DFG personnel.

-survey of regarding potential utility of various methods of fisheries management as applied to the nearshore fishery

-presentations by scientists

-discussion sessions

-"Nearshore Research Protocols and Data Gaps," one-day workshop, January 2001. DFG and about half dozen outside scientists.

-discussion of DFG efforts to determine and prioritize research needs and methods

-Peer review. As mandated by the MLMA, the NFMP underwent peer review.

-Main peer review: 6 outside reviewers (3 out of state, none out of country) independently reviewed the FMP, then met together to finalize a common report.

-Peer review of redraft of "fishery control rules" section of NFMP by two outside reviewers (both in-state)

-"Research Protocols" team, 2001-2002. DFG and outside researchers help to develop plans for research. Met several times during 2001-2002, and again in 2003, to develop protocols for further research. This was both brainstorming and the concrete development of the CRANE (Cooperative Research and Assessment of Nearshore Ecosystems) sampling program.

-further developments of CRANE: collaborative implementation of one year of sampling in 2004 (NOAA funding, part of Coastal Impact Assistance Program, to mitigate effects of offshore oil drilling). Partial report published (http://www.dfg.ca.gov/marine/fir/pdfs/crane.pdf)

by the Committee, but the Department and Commission received constituent input in different forums and it is difficult to determine exactly how stakeholder views influenced the development of the NFMP. The Department received—and responded to—hundreds of comments on the NFMP. The compilation of comments is included in an appendix to the plan.

Science in the NFMP

The NFMP appears to reflect extensive scientific input. Department researchers had been engaged in studies of nearshore fishes and fisheries, which contributed to the overall knowledge base. Their research was directed, among other things, toward basic EFI details such as growth rates, movements, and diets of nearshore fishes, analysis of geographical distributions, population and fishing trends in fish stocks, responses of populations to climatic change, and innovative fishery-independent methods for assessing nearshore fish abundance, biomass, habitat relationships, reproductive success, and responses to marine protected areas.

In addition, Marine Region staff assembled information from the literature on research conducted by academic, federal, and other scientists on nearshore fishes and habitats. The NFMP team sought direct contributions from scientists outside the Department in workshops and peer review panels, as well as in collaborative efforts between the Department and outside scientists. The Department also had the benefit of methods used in other jurisdictions, such as the PFMC, to set allowable catch levels based on population models, and had reviewed different approaches to regional management and allocation.

Box 8 provides a summary of efforts to solicit information and advice from scientists outside the Department.

The NFMP does not state explicitly how all of the scientific information was used. Some of the recommendations by the peer-review panel were not included in the final document, such as inclusion of additional important nearshore species, description of fiscal resources needed for acquisition of EFI, and response to the concern that it would be difficult, under the plan, to determine whether a species (especially a data-poor species) were actually being overfished. Other peer-review recommendations were included in the final version, such as addressing serial depletion (the effects of fishing on the least productive species in a group of species managed together); adoption of more conservative harvest control rules than the PFMC; adoption of four state regions (not three); and dropping a draft approach of designating certain percentages of area in MPAs in favor of relying on the MLPA, though the NFMP itself does provide criteria for MPAs that would make them useful for nearshore fishery management.

The collaborative effort on developing research protocols and earlier sessions with outside scientists reportedly helped to establish research principles and protocols, including methods for conducting surveys, the use of no-fishing reserves to supply comparative data for assessing stock status, and the effects of fishing on the ecosystem.

A member of the Advisory Committee observed that much up-to-date science was used in the final NFMP, including methods for setting catch levels for species under data-moderate conditions that are similar to those used by the PFMC. The final NFMP set important thresholds for population biomass at higher levels than the PFMC normally uses, as a precaution against overfishing and to help mitigate any ecosystem effects of fishing.

The NFMP also provided for regional Department management to account for regional differences in oceanography, species' distributions, growth rates, population productivity, and prosecution of the fishery. It calls for innovative methods of population and ecosystem assessment that include comparisons of areas subject to different levels of fishing (including MPAs) and advanced underwater habitat mapping.

Components of the final nearshore FMP

According to the introduction to the NFMP plan, the core of the project was to develop a management strategy to meet the MLMA's primary goal of sustainability by meeting several objectives:

- preventing overfishing,
- rebuilding depressed stocks,
- ensuring conservation, and
- promoting habitat protection and restoration.

The NFMP set out five goals, each one addressing an aspect of fishery management and in combination providing an integrated approach to meeting MLMA sustainability guidelines.

Goal I: Ensure Long-Term Resource Conservation and Sustainability—Ecosystem health, sustainability of fisheries, rebuild depressed stocks, limit bycatch, maintain health of habitat, coordinate with adjacent coastal states.

Goal II: Employ Science-based Decision-making—Adaptive, cooperative and collaborative data gathering, periodic review.

Goal III: Increase Constituent Involvement in Management—Open decision-making process, involve constituents in planning, and research protocols.

Goal IV: Balance and Enhance Socio-economic Benefits—Provide for non-consumptive use, coordinate commercial and recreational fisheries, consideration of long-term interests of people dependent on fishing, mechanisms to resolve disputes.

Goal V: Identify Implementation Costs and Sources of Funding—Fees, resources to acquire EFI, alternate sources of funding.

Discussions leading to the draft FMP considered potential use of MPAs as both places where near-intact ecosystems might persist, and as reference points for measurement of the ecosystem effects of fishing (under data-rich conditions). One participant notes that the Department's first effort to implement the MLPA in 2001 had implications for the nearshore plan related to marine protected areas. Conservation groups got more involved in the NFMP process, interviewees observe, because they thought they could get some protection for nearshore species through that vehicle when the MLPA process foundered.

Evaluation of ecosystem effects of fishing was spelled out clearly (under data-rich conditions), and ways of modifying fishing in response to ecosystem effects were identified. Failing data-rich scenarios, allowable levels of fishing were identified conservatively to allow larger populations of fished stocks and potentially less effect on the ecosystem. The selection of OY followed a formula more conservative than federal practices for groundfish. Restrepo's precautionary approach was also used to provide a buffer for both sustainability and ecosystem health in data-poor conditions. Regional management also would aid in establishing more localized effects of fishing on ecosystems since ecosystems vary geographically. However, this approach depends on the development of research programs, the implementation of regional management, and the implementation and enforcement of MPAs. The research necessary to support data-rich levels of ecosystems management is very intensive and expensive, especially if it is replicated regionally throughout the state.

In order to foster sustainability of nearshore fisheries, the NFMP established three levels of knowledge of a fishery (data-poor, data-moderate, and data-rich), and rules for establishing catch levels at each knowledge level. Control rules were based in part on Restrepo's precautionary approach, but provided original details of management in data-moderate and data-rich conditions. As with the consideration of ecosystem health, the plan adopted control rules for data-moderate fisheries that are more conservative than federal practice. The NFMP described areas of research that would provide the

EFI that would allow management to move from one knowledge level to another. Regional management would also allow for recognition of geographical variation in biological characteristics and abundance of fished species. MPAs are noted as a buffer for mistakes in management, miscalculations of bycatch, and other data gaps. Alternatives for a restricted access program were discussed as a way of reducing capacity in the fishery.

However, while records from the fishery would probably be sufficient to detect overfishing in data-moderate and data-rich scenarios, it is possible that overfishing could go undetected in data-poor scenarios. Regional management would be required to detect more localized effects of fishing, and a successful restricted access program for the commercial fishery would be required to reduce capacity in that sector of the fishery. One thing missing from the harvest control rules is guidance on how to adjust harvest levels (if at all) once MPAs have been implemented. The issue is whether to consider biomass within the MPA as part of the entire population biomass, and set harvest accordingly (which would effectively increase the rate of harvest per unit of area in the area outside of MPAs), or to consider only the biomass in the areas outside of MPAs, and set harvest accordingly (which would reduce the total allowable catch levels). This reportedly was a contentious issue in the Advisory Committee meetings.

As a measure to address the objective of rebuilding depressed stocks, the NFMP included control rules for data-moderate stocks that provided a higher threshold for a stock to be considered overfished than federal practices and specified the development of rebuilding plans.

Limitation of bycatch of nearshore species, though not addressed in detail, is discussed under restricted access methods, gathering of catch data, and use of MPAs. Bycatch of deeper-water species from depressed populations has become more of a concern, because it may limit landings of some nearshore species caught in association with the deeper-water fish whose catches are restricted. Coordination with adjacent states is done in part through the PFMC, to manage stocks straddling the California-Oregon border.

An extensive list of research programs was presented in the NFMP to improve the data used in management. These included:

- gathering more data on vital statistics of some species,
- learning more about geographical ranges and geographical variation in species,
- mapping habitat distributions,
- monitoring “recruitment” of young fish into the population,
- developing of single-species assessments to move some species to data-moderate management,
- developing of improved fishery-dependent data-gathering programs for commercial and recreational fisheries,
- developing of fishery-independent data (using MPAs, collaborating with industry),

- gathering more information about ecosystems (particularly using MPAs), and
- gathering socioeconomic data.

Most of these programs as outlined in the FMP were intended to be carried out on local levels, so that the spatial aspects of the species and the fishery could be determined. Items under Goal IV (Socioeconomic benefits) discussed non-consumptive uses such as observation, photography, and research on near-natural populations and ecosystems. These issues may be addressed through MPAs, and perhaps by conservative management of fishing.

The plan tackles coordination of commercial and recreational fisheries through a framework for allocation. Observers note this was one of the most contentious issues in the development of the NFMP. The approach proposed in the plan and adopted by the Commission was to examine historical records of fishing, particularly at the regional level, and then use regional stakeholder groups to sort things out. In contrast, the federal management plans had determined total allowable catch (for most species, based on half of recent total catches), subtracted the recent levels of recreational catch, and allotted the remainder to commercial fishing. The plan includes sections on management, enforcement, research, stock assessment, cost projections, but no specific measures on dispute resolution mechanisms.

The requirement to evaluate long-term interests of people and communities dependent on fishing was to be resolved by gathering regionally-based data on levels of fishing, and regionally-based socioeconomic data, and then using regional advisory groups to help evaluate community needs. A restricted access program for the commercial fishery may help to ensure that those commercial operations remain in the fishery, though this has not always occurred when restricted access has been implemented.

As noted above, the Department has estimated the overall costs of the plan at just over $10 million, with no separate estimate of plan preparation costs. The "preparers" lists in the document alone indicate a tremendous effort. Outside facilitators and constituent involvement experts were retained with external sources of funding.[74] Private funds also were used to pay for scientific advice on development of the control rule and staffing for the commission. Peer reviewers received a modest honorarium, and advisory committee members were reimbursed for meeting costs. Scientific contributors to parts of plan development volunteered their time, and some advisory committee members participated as part of their jobs. Others were volunteers, also representing constituencies. Department staff members indicated significant job stress during the development of the FMP, in part because the organization of the effort changed over time, and in part because the overall effort was so large, according to the "NFMP Debriefing" document. Many comments in the "NFMP Debriefing" document indicated that the work-

[74] Public process consulting to support MLMA implementation from April 2000 through October 2001 was supported by a grant of $216,682 through the National Fish and Wildlife Foundation.

load was high, the deadlines too short, and the assignments too fluid. Some felt that their normal duties had to be neglected when they were assigned to the plan.

Since the NFMP's adoption, the Department has reported on implementation in two updates, the most recent in 2006. California continues to co-manage 16 of the 19 species covered in the NFMP. The Department has representatives on the PFMC Groundfish Management Team and the Science and Statistical Committee (SSC). The Department proposes catch limits based on its more conservative harvest-control rules and these are usually promulgated by the Commission. The Department collaborates with Groundfish Advisory Panel, a constituent group of the PFMC, SSC, and NOAA fisheries biologists in developing stock assessments and other fishery information. Participation in federal management helps to coordinate management of species found in Oregon and Washington, as well as California, according to managers interviewed for this report.

The NFMP had called for delegation of management authority within California of all 19 species to California control. This would allow some measures that would be more difficult to undertake in the Federal process, however this concept has since been abandoned. Regional management was a major component of the final NFMP. The Department has instituted a regionally-based permit system for commercial fishing, and has now established regional monitoring of both commercial and recreational landings. Some collaborative research programs are directed towards locally-based EFI. However, the Department currently does not have the resources to conduct regionally-based assessments and therefore cannot set regionally-based quotas. Interviews suggest some Department scientists believe a coastal, rather than regional, scale is sufficient for management. Even for statewide assessments California benefits from collaboration with federal authorities. As noted below, it has redirected the contracts for regional advisory panels.

Nearshore fishery permits were first required in 1999, when more than 1200 were issued. This number decreased to around 500 by 2002. Since then a full restricted access program was instituted for the shallow nearshore fishery, setting regional goals for the number of permittees. The number of permits has decreased by attrition since then, but has not yet reached the goals. Moratorium permits for the deeper nearshore species were issued in 2003, and there has been some attrition in the number of permittees. An ad hoc statewide Groundfish Task Force of constituent representatives is consulted periodically by the Department, particularly for biennial review of regulations, and for some in-season adjustments of the fisheries. The NFMP called for regional advisory committees to participate very directly in the regional management of the nearshore fishery; in fact they were considered a central part of the entire program. However, a contract for development of these committees was redirected, and the committees have not been established. The issue is funding, at two levels: funding for operation of the committees themselves, and funding for the regional stock assessments that would have been used as input for the regional committees. As noted above, there also appears to be a difference in scientific views about the importance of regional assessments.

General provisions of the MLMA

As noted above, the MLMA can be read as directing the Department to increase both constituent involvement and scientific input in all of its decisions regarding marine resources, not just in development of FMPs. Some change has occurred in both these areas.

Constituent involvement

In addition to the activities aimed at engaging constituents and stakeholder groups in the development of specific plans such as those for white seabass and nearshore fisheries, the MLMA expressed a policy favoring participation of stakeholders above and beyond conventional hearings and notice and comment rulemaking. It calls for this emphasis in development of all regulations, not just those associated with FMPs, as well as research plans, the annual status report, and other activities. The law describes fair and reasonable dealings with constituents as a measure of effectiveness (7056(m)).

The Department undertook numerous activities related to implementation of the constituent engagement policy of the MLMA. These included: designation of an in-house team to oversee MLMA implementation activities, particularly constituent outreach; hiring a team of consultants to provide public communications, constituent engagement and facilitation services; convening an advisory group to oversee implementation of MLMA; conducting an all-staff training in public communication and constituent outreach tools and approaches, compilation of a handbook of tools, tactics and best practices for outreach and communication; inclusion of extensive constituent outreach guidance in the Master Plan; development and launch of an updated website; inclusion, documentation and response to public comments in each of the new or revised FMPs; expanded notice procedures for public hearings; addition of hearing and meeting sites intended to meet the MLMA directive to "foster participation, meetings should be conducted in those areas most affected by decisions" [7059(a)(4)].

It is less evident that the Department followed through on other MLMA recommendations related to constituents. The call for dispute resolution mechanisms, integration of constituents in the design and execution of research programs, or "collaborative and cooperative" approaches such as co-management, community-based management and similar means to devolve authority have not materialized, though some user groups, such as sea urchin divers, have pursued and support the concept of such programs. According to persons interviewed for this report, the new requirements went beyond the familiar territory of engaging with sport and commercial fishermen, and that in some cases it was difficult for Department staff to reach out to new constituents, such as conservation advocates.

Finally, interviews suggest the Department has looked to the PFMC process to address some MLMA constituent engagement objectives related to implementation, at least for the Nearshore FMP.

This approach shifts costs of public outreach to the federally supported process while still providing opportunities to raise the interests of California constituents.

Science-based management

As with constituent engagement, the MLMA makes the use of science as the basis for management applicable not just to FMPs or regulations, but the foundation that informs every activity of marine resource management. It calls for collaborative science, partnerships with academic and scientific institutions, peer review, development of research protocols and priority setting for research activities, engagement of the scientific community in the development of plans and conservation measures. (7050(b)(6), 7056(g), 7060, 7062, 7074, 7075, 7081.)

Actions in fulfillment of these policies are clear in the Master Plan, the Status Reports, and the two mandated FMPs. In addition, the Department contracted for a report on the use of peer review, and sought scientific peer review on existing plans and measures. The Department also participates in partnerships with the Pacific States Marine Fisheries Commission, the Pacific Fishery Management Council and NOAA Fisheries on an array of research, stock assessment, and other scientific projects. According to persons interviewed for this report, the science demands of the MLMA, while laudable, were challenging, time consuming and expensive, particularly given that information collection is traditionally fishery-dependent.

Other plans and regulations

In addition to delegating authority to the Commission and Department to develop plans for specific fisheries, the MLMA directs that other fisheries be managed by the same policies, and designates fishery management plans as the preferred tool. Since enactment, the Department and Commission have adopted a recovery and management plan for abalone and a fishery management plan for squid, and have begun development of a plan for Pacific herring.[75] In keeping with MLMA policies, a peer review of stock assessment science for herring, an updated stock status report, and expanded opportunities for public involvement have been added to the existing regulatory framework and annual review of management measures. Annual catch quotas are based on spawning biomass estimates, age structure analysis, and up-to-date oceanographic information. For the 2008-09 season, the Commission adopted a

[75] Sea Urchins are listed on the Marine Region MLMA website as one of the species for which there is a management plan, but at present there are only regulations adopted by the commission in consultation with the California Sea Urchin Commission and the Department. The San Diego Watermen's association has proposed a community based management approach for their fishery. *See,* The San Diego Sea Urchin Project, November 2008.

more conservative quota based on Department recommendations and studies showing low spawning returns 2006-2007 and 2007-2008, as well as declining size-at-age.[76]

The Legislature limited recreational abalone fisheries to north of San Francisco Bay in 1997 based on Department recommendations and studies showing a precipitous decline in abalone populations. There is no commercial fishery for this species. Subsequent legislation mandated an Abalone Recovery and Management Plan [ARMP] to be completed before January 2003.[77] The plan is not laid out as an FMP under MLMA's formulation and does not incorporate MLMA policies. The Commission adopted the ARMP in December 2005. The management portion of the ARMP establishes guidelines for determining allowable take levels and for closing and reopening fisheries. During the first seven years of ARMP implementation, management of any future potential commercial fishery will occur with limited resources under an interim plan that sets a total allowable catch level and uses established criteria to guide regulatory change. However, because the interim plan operates in a data-limited environment, it follows a precautionary approach to setting take. The plan uses marine protected areas as refugia from take for all abalone species. If additional resources become available, a long-term management plan may be implemented using zonal management with take allocated through an abalone tag system. Within the past three years, an Abalone Advisory Group was convened to provide the Department and Commission a range of alternatives for managing a potential commercial fishery at San Miguel Island in southern California. Results from that public process have yet to be completed or presented to the Commission. The recreational abalone fishery continues to operate with use of a "report card" system that provides data from which annual catch is estimated.

At the request of the fishing industry, prior to MLMA (1997), the legislature called for called for a report on the squid fishery with recommendations for a "conservation and management plan" covering certain enumerated subjects.[78] Concerns about excess capacity, expansion of the fleet, and fluctuations in squid relative to El Nino events provided momentum for the legislation. In 2001, the Legislature passed a bill requiring the Commission to manage the squid fishery under the MLMA as of January 2002. After much consultation with two advisory groups and stakeholders from all sectors, the Marine Region published a draft plan for public review in April 2002, and eventually presented a proposed fishery management plan and accompanying regulations to the Commission in 2004. Marine Region staff told the commission that the FMP was "developed under MLMA provisions."[79]

The Department's proposal had a goal of curtailing expansion in the fishery, conserving the squid resource, and reducing the potential of overfishing. The Department recommendation included:

- a control rule,

[76] Department, Fisheries Forum Annual Report for 2009. Available online at http://www.dfg.ca.gov/marine/fforum2009.asp
[77] Fish and Game Code §5522.
[78] Fish and Game Code § 8426(c)
[79] Transcript of Commission meeting, Aug. 27, 2004; statement of Dale Sweetnam.

- a harvest cap of 118,000 tons,
- restricted access and options for reducing capacity to match the cap,
- time and area closures to avoid conflicts, avoid protected species and allow uninterrupted spawning for squid,
- requirements for logs, and
- restrictions on lights and gear.

According to the Department the recommendation was consistent with the federal plan developed by the PFMC. The plan was presented as a framework that would allow the Commission to make annual adjustments without amending the plan. Stakeholders testified that fixed catch limits were included in the plan, rather than in regulations, thereby locking in a number rather than a calculation or process.

Measures that raised the most concerns during public testimony and Commission debate were those related to the quota, capacity reduction, the window for qualifying for permits, treatment of transferable and non-transferable permits, and the cost of permits. Conservation advocates claimed that the annual catch limit did not comport with the MLMA because it was based on MSY, not MSY reduced to produce an objective of OY.[80] Industry advocates disputed whether the proposal honored grandfather rights provided in other fishing legislation. After a lengthy and, according to some, chaotic debate, the Commission re-noticed the portion of the proposed regulations dealing with non-transferable permits. At its December 2004 meeting the Commission adopted criteria that addressed industry concerns that fishers would be excluded but effectively negated the stated purpose of the plan to reduce capacity. In fact, later descriptions of the Squid FMP eliminated capacity reduction as a stated goal, and there were more vessels making commercial landings in 2008 than permitted vessels making landings in 2007.[81] The plan set permit fees, closed some areas to use of lights, modified logbook requirements, and opened new areas to experimental market squid fishing.

The 2005/2006 fishing season was the first year of operation under the management plan. Since then, biologists have raised issues related to the fisheries operations on the spawning grounds and the need to allow for sufficient egg escapement. The most recent status report sets out a number of information needs critical to gathering fishery independent data that would aid management of the fishery. Landings in the Monterey area have declined since 2005, but biologists attribute this to environmental conditions.[82] In 2008, market squid was the second largest fishery in terms of volume and the most valuable fishery. Statewide, 76.5 million pounds (34,700 metric tons) of market squid were landed in

[80] §7056(a)
[81] Department, Fisheries Forum Annual Report for 2009. Available online at http://www.dfg.ca.gov/marine/fforum2009.asp
[82] Id.

2008 with an ex-vessel value of $23.9 million.[83] In 2007, the fishery landed 109.7 million pounds (49,802 metric tons) and was worth $25 million. In 2008, 93 vessel permits, 62 light boat permits, and 22 brail permits were issued.

Amendments to the MLMA and related legislation

The Fish and Game Code sections that encompass the MLMA have been amended four times since enactment of the law in 1999. In 2001 the Legislature added market squid to the species for which the Department would develop a management plan [see discussion above]. SB 209 called for Commission action on a plan but set some provisions legislatively that were repealed upon completion and adoption of the market squid FMP. The following year, Assemblyman Keeley introduced and the Legislature passed a bill extending the deadline for development of the Master Plan to 2005. In 2004, the Legislature passed a measure granting the Commission authority to manage all bottom trawl fisheries not covered by federal or state FMPs, set specific requirements for trawl gear, closed certain areas to bottom trawling, and restricted the use of trawl nets in the pink shrimp fishery. A bill allowing the Commission to hire staff was passed in 2006, enhancing its capacity.

In 2008, the Legislature passed, but the Governor vetoed, a bill to authorize preparation of management frameworks for any state fishery. AB 2532, so-called "MLMA Lite" by proponents in the conservation community, would have authorized the Department to develop management measures where there was insufficient information to develop a full FMP or where evidence of a decline indicated immediate management was necessary. It provided for an interim action plan and encouraged development of pilot co-management approaches and creation of advisory committees. The Governor's veto message cited lack of full development of concepts for co-management and unclear authority, and noted that he had signed AB 1690, establishing the Dungeness crab task force at the Ocean Protection Council, expected to develop a co- management framework for that fishery. Observers suggest that the measure failed because the Department argued it already had authority to take such actions under MLMA and opposed the bill. The conservation organization that developed and advocated for the measure, according to interviews, did not have the critical mass of support needed to get the bill signed in the Governor's office (there were only two groups on record in support of the measure, according to the legislative history).

Numerous other amendments to the Fish and Game Code specifying measures for halibut, Dungeness crab and other fisheries have occurred since passage of MLMA in 1998, commonly without reference to the MLMA. These measures either amended code sections for fisheries that were not managed by the Commission before 1999, such as halibut. In the case of Dungeness crab, federal law allowed California, Oregon and Washington (who already managed this species since 1996) to achieve a level playing field in managing fishers who fish in one state but unload in another. Although it did not amend MLMA,

[83] Id.

passage of the Marine Life Protection Act (MLPA) in 1999 has had a significant effect on implementation of MLMA. Persons interviewed for this report say that the Department exercised its discretion to shift some portion of staff and budget resources from MLMA implementation, including planning and constituent engagement activities, to the MLPA planning effort.

Part 4: Next Steps

This description of the context, enactment and implementation of the MLMA provides baseline information for the next steps in this "lessons learned" assessment of the MLMA. Among the points emerging which can inform assessment (Task 2) and development of recommendations (Task 3) are the conflicting expectations about the Act, the actual provisions of the Act, resources provided for implementation, and actual implementation processes. More information about MLMA implementation can be expected to develop during the next steps of this project, but this report provides a foundation on which to proceed.

Recent events demonstrate that the challenges that motivated the authors of the MLMA continue. For example, the iconic commercial salmon fishery has been closed in California for two years. And we have increased understanding of how actions in rivers and land uses affect ocean resources. For example, the National Marine Fisheries Service issued a Biological Opinion (June 2009) addressing the linkages between blocked access to spawning areas, water diversions, winter and spring Chinook, Central Valley steelhead salmon, the southern population of North American green sturgeon, and Southern Resident killer whales which rely on Chinook salmon for food.[84] The collapse of the salmon fishery demonstrates the challenges of managing complex, organic systems. Salmon are managed under a federal FMP with more resources and tools than are available under the MLMA and to the Department and still the runs of salmon decline to the point of requiring closure. A plan is not self implementing and does not guarantee success.

Federal laws and policy are also shifting. The PFMC has identified essential fish habitat for groundfish, coastal pelagic species (sardines, mackerel, northern anchovy, jack mackerel), salmon and highly migratory species. The PFMC identified estuaries, canopy kelp, seagrass and rocky reefs as habitat areas of particular concern, and identified "areas of interest" for further consideration. The areas off the California coast are listed in Box 9.

Box 9. California Habitat Areas of Interest

Seamounts including: Gumdrop Seamount, Pioneer Seamount, Guide Seamount, Taney Seamount, Davidson Seamount, and San Juan Seamount.

Also: Mendocino Ridge; Cordell Bank; Monterey Canyon; specific areas in the Federal waters of the Channel Islands National Marine Sanctuary; specific sites in the Cowcod Conservation Area.

Although there is no federal requirement for ecosystem-based approaches to management, the 1996 MSA amendments called for a report to Congress on the topic.[85] That report and increasing emphasis on ecosystem approaches led to formation of a task force that produced guidelines for ecosystem-based approaches to fishery management.

[84] The biological opinion is available at: http://swr.nmfs.noaa.gov/ocap.htm

[85] D. Fluharty, Chair, Ecosystems Advisory Panel, Report to Congress (1998).

In 2006, Congress again made substantial revisions to the legislation that governs federal fishery management. The 2006 MSA reauthorization[86] requires the regional fishery management councils to develop annual catch limits for all fisheries that are based on scientific recommendations and at a level that prevents overfishing. It requires scientific and statistical committees of the councils to provide recommendations for fishing levels and to disclose financial conflicts of interest. Fishery managers are directed to develop rebuilding plans that end overfishing immediately, and will be held accountable if they allow annual catch limits to be exceeded. The 2006 amendments called for another study on the state of the science for advancing ecosystem considerations in regional fishery management, but the effort is delayed according to NMFS. The PFMC has held joint sessions of its habitat committee and ecosystem-based fishery management interests, reviewed the state of the science and practices in other regions, and summarized current and potential steps to move toward an ecosystem-based approach.[87]

A national standard calling for analysis of the effects of fishery management measures on fishing communities requires federal managers to take into account the importance of fishery resources and their potential economic impacts on fishing communities.

The 2006 amendments also include extensive provisions aimed at increased application of rights-based programs, including limited access privilege programs (LAPPs). The LAPP provision includes new standards that affirm public ownership of the fish resources in U.S. waters, requires periodic reviews of the programs and measures to protect small-boat fishermen's access to fisheries, and specifies a term limit of 10 years on quota shares.[88]

Of potential interest to California communities are provisions that provide for "sustainability plans" that may be developed by fishing communities. Not only did Congress address many of the concerns that interest groups raised about access privileges and quota share programs, but it also took special note of fears of consolidation and the potential for quota programs to "ignore the community and next-generation fishermen who were not part of the initial allocation and could be forever priced out of the fishery."[89] Accordingly, the 2006 MSA now provides for limited access privilege program shares to be issued to communities and regional fishing associations. As of this writing, further action on guidelines had been postponed in deference to other priorities, though the agency has published non-regulatory technical advice on the benefits of various program design options.

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[86] Magnuson-Stevens Fishery Conservation and Management Reauthorization Act, Pub. L. 109-479 (Jan. 12, 2007).
[87] PFMC, Supplemental Attachment 4 (April 2007) *Draft Summary Minutes of a Joint Session of the Habitat Committee and the Ecosystem Based Fishery Management Subcommittee of the Scientific and Statistical Committee* (Nov. 14 2006).
[88] 16 U.S.C. §1853 (a).
[89] S. Rpt. 109-229 at 25. The intent of Congress regarding the kind of communities for which this provision is designed is spelled out in report language: The Committee intends the Councils to consider as ''traditional'' those uses that predate contemporary commercial fishing in smaller, isolated communities that can demonstrate historic dependence on combination fisheries or participation in the fishery during years that may not fall within the qualifying period for individual LAPPs. S. Rpt. 109-229 at 27

Authors (in alphabetical order)

J. Michael Harty, Principal, HCCM, has overseen completion of two lessons learned evaluations for the MLPA's Central Coast and North Central Coast study regions. He was co-author with DeWitt John of the Central Coast report, and principal author of the North Central Coast report. Harty has over 13 years of experience in the field of public dispute resolution, and has designed and conducted multiple stakeholder processes involving complex and polarized natural resource issues within and outside California. J.D., Georgetown University.

Mike Healey has over three decades advising policy makers on natural resources management, ranging from the use of basic science in policy-making to developing effective institutions for adaptive management. He has worked effectively with social scientists. He served as CALFED lead scientist (2007-08). PhD (Natural History) University of Aberdeen, Scotland.

Suzanne Iudicello has more than two decades experience with fisheries and other marine policy issues, largely on the West Coast. An attorney, she is broadly knowledgeable about fisheries policies and has also worked with stakeholder groups advocating changes in policies. J.D., George Washington University.

DeWitt John has extensive experience assessing performance and helping state and federal natural resource, environmental and economic development agencies to design and manage effective programs. He also has eight years of experience in state government, including six at the Colorado Department of Natural Resources. Ph.D., Political Science, University of Chicago.

John Kirlin has over three decades experience advising state, local and federal policy makers and managers in a broad range of policy areas, including the environment, species protection, energy, regional governance and state and local government finances. He served as Executive Director of the Marine Life Protection Act Initiative (2004-07) and was recently Executive Director of Delta Vision (2007-2008). Ph.D., Political Science, UCLA.

Ralph Larson is a long-time faculty member at San Francisco State University (now emeritus), and an expert in California near shore fisheries. He has served as an advisor to the California Department of Fish and Game. Ph. D., Biology, University of California, Santa Barbara.

MLMA LL Project: Preliminary Contact and Participant List

The following is a preliminary working list of people who have provided input through an in-person or telephone interview or other communication to this point in the project. ***This is not a final or complete list of contacts, information sources, or interviews for the project****. The team has received the names of numerous people whose names do not appear on this list; some may be interviewed at a future date or provide useful information. In some cases, for example, the team has tried unsuccessfully to find a convenient time for an interview or discussion. In other cases the team either has set up a future interview date or is working toward that goal. These names are not on this list. Contacts and interviews are expected to continue as the project team prepares drafts of its evaluation and recommendation reports that will be available for public comment. The team's ability to conduct interviews is subject to project resources.*

Commercial Fishing	**Recreational Fishing**	**Environmental/Conservation Group**
Fosmark, Kathy	Raftican, Tom	Fujita, Rod
Liquornik, Harry	Engels, Bob	Ostdahl, Maggie
Maasen, Jeff	Thomas, Roger	Reyna, Karen
McCorkle, Mike		Roberts, Santi
Miller, Chris		Wing, Kate

Scientists/Academics	**Other Affilications**	**SCC/OPC**
Christopher Dewees,	Heneman, Burr	
Phipps, Kristina	Nudelman, Deb	
Starr, Rick	Valentine, Michael	
	Weber, Mike	

Commission	**CA DFG Staff (current and past)**	**NMFS**
Shuman, Craig	Barnes, Tom	MacCall, Alec
Shea, Adrianna	Bunn, David	
Carlson, John	Mastrup, Sonke	
	Phelps, Lenore	
	Ryan, Connie	
	Vojkovich, Marija	
	Wilson-Vandenberg, Deb	
	Wolf-Sciarrotta, Patty	
	Yaremko, Marci	

Glossary of Acronyms

ARMP	Abalone Recovery and Management Plan
CEQA	California Environmental Quality Act
CRANE	Cooperative Research and Assessment of Nearshore Ecosystems
CWPW	Committee on Water, Parks and Wildlife
DFG	Department of Fish and Game
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFI	Essential Fishery Information
ESA	Endangered Species Act
FCZ	Fishery Conservation Zone
FGC	Fish and Game Code
FMP	Fishery Management Plan
LAPP	Limited Access Privilege Program
MFCMA	Magnuson Fishery Conservation and Management Act (later renamed to Magnuson-Stevens Fishery Conservation and Management Act)
MLMA	Marine Life Management Act
MLPA	Marine Life Protection Act
MPA	Marine Protected Area
MSA	Magnuson-Stevens Act (see also MFCMA)
MSY	Maximum Sustained Yield
NFMP	Nearshore Fishery Management Plan
NFMA	Nearshore Fisheries Management Act
NOAA	National Oceanic and Atmospheric Administration
OPC	Ocean Protection Council
OY	Optimum Yield
PFMC	Pacific Fishery Management Council
PSMFC	Pacific States Marine Fisheries Commission
RFP	Request for Proposals
SFA	Sustainable Fisheries Act
SSC	Science and Statistical Committee

Appendix 1. An Overview of Restricted Access Fisheries

By: Michael Healey

Introduction

Purpose and scope of issue paper

This issue paper provides a brief overview of restricted access fisheries (RAF). It is intended to provide background material to the "lessons learned" study of California's Marine Life Management Act (MLMA) that is being conducted under contract to the Ocean Protection Council.

RAF are fisheries in which individuals or groups of individuals have been granted exclusive property rights to some component of the fishery. RAF of one sort of another have become quite commonplace in the past 3 decades (Beddington et al. 2007, Wyman 2008). The US, however, has been relatively slow to implement restricted access policies, particularly those involving catch shares. This paper will also discuss some of the reasons for resistance to RAF.

Definitions of RAF

As defined in the MLMA, a "Restricted Access Fishery" is a fishery in which the number of persons who may participate, or the number of vessels that may be used in taking a specified species of fish, or the catch allocated to each fishery participant, is limited by statute or regulation.

RAF is an umbrella term for a range of fishery policies that transfer some form of ownership rights for fish resources to individuals or groups of fishers. There are a number of ways in which such rights can be conferred and the terminology can be quite confusing. Hilborn et al (2005) define 3 broad classes of RAF representing increasingly exclusive rights to fish:

1. Limited entry fisheries in which the number of individuals or vessels permitted to fish for particular species is restricted by regulation. In most cases it is individuals who are licensed. However, the licenses are also typically associated with a particular size and class of vessel and the license holder cannot significantly alter his vessel without satisfying other regulations. Licenses may be freely transferable, transferable with restrictions, or not transferable.

2. Quota rights fisheries in which a permit to fish is associated with a particular share in the allowable catch or the allowable fishing effort. Individual rights to a share of the allowable catch go by various names such as Individual Quota, Individual Fishing Quota, Individual Vessel Quota. Quota shares or access rights may also be allocated to communities as in the Alaska Community Development Quotas (NRC 1999). Shares in allowable effort can involve allocation of a portion of allowable traps in a lobster fishery or allocation of a portion of allowable fishing time such as the days at sea policy for New England groundfish (Brodziak et al. 2008). Quota or other shares may be transferable or not. Other terms for this

broad class of fishery policies include Dedicated Access Privilege (DAP), or Limited Access Privilege (LAP) (Anderson and Holiday 2007). LAP is the term used in the reauthorized Magnuson Stevens Act.

3. Territorial Use Rights Fisheries (TURFS) in which individuals, groups or communities are given exclusive or semi-exclusive rights to fish within a designated section of shoreline or patch of ocean. Small scale TURFS have a very long history in pre-industrial societies and remain an important management policy in some modern nations (e.g., Weinstein 2000). The Alaska Salmon Enhancement Societies (Hilborn and Eggers 2000) are a form of TURF in which the society has exclusive rights to fish within a designated zone.

For any of these policies, individual fishers may band together to share equipment and catch. Cooperative agreements among fishers include the At Sea Processors Association, an agreement among the owners of 19 catcher/processor vessels to share resources and minimize costs in harvesting their quota shares in the Alaska pollock and Pacific whiting fisheries (www.atsea.org/), and other agreements facilitated by the American Fisheries Act of 1998 (Kitts and Edwards 2003).

A Brief Historical Perspective on Fishery Management Leading to RAP

Pre-industrial society fisheries were conducted from shore by traps or small seines or from small boats by hand line within a few miles of land. Without mechanization, and given the vastness of the sea, it appeared to observers in the 18th and 19th centuries that human's puny efforts could have no lasting impact on the sea (e.g., Anyanova 2008). With the rapid industrialization of fisheries after World War 2, it quickly became apparent that the limitless ocean hypothesis was a myth (Beddington et al. 2007) and accumulated evidence suggests that human exploitation has had important impacts on coastal ecosystems throughout history (Jackson et al. 2001). Nevertheless, the paradigm of the inexhaustible ocean was a powerful influence on fishery management through most of the 20th century and established a legacy that managers still struggle to transcend.

One of those legacies is "open access fisheries" in which anyone may participate by simply purchasing an inexpensive license (the elderly and the young are often excused from even this nominal degree of administration.) Through much of the 20th century marine fisheries were managed under this policy. However, as it became apparent that fish stocks were becoming depleted, governments established management agencies and began to restrict fishing. Initially, restrictions focused on inputs; types and designs of fishing gear; places and times when fishing was allowed. But as it became clear that input controls were frequently insufficient to ensure conservation, attention turned to output controls; total allowable catches, body size and/or sex restrictions on landings. In the past few decades, restricted ac-

cess policies have become popular as a means to accomplish conservation goals and improve the economic performance of fisheries. Throughout this evolution, design of management policy was assisted by an expanding toolbox of quantitative methods for stock assessment (e.g., Hilborn and Walters 1992), improved understanding of fishery economics (e.g., Clark 1990), and better understanding of the social anthropology of fishers (e.g., Pinkerton 1994a, Ostrom 1990).

Through the second half of the 20th century three paradigms of fishery policy have competed for attention: management for maximum biological yield; management for maximum economic yield; and management for maximum social benefit. Initially the policy to maximize biological yield held sway and management agencies were configured and staffed to pursue this objective. Then the policy of maximizing economic yield became dominant and agencies were somewhat reconfigured and staffed to support this policy. Policies focused on social benefits lagged somewhat as there was no generalized model that could be used to inform management. In recent years, however, a solid theoretical framework of community based common pool resource management has emerged and this is beginning to influence policy decisions. All three approaches are incorporated in modern integrated management of fisheries.

MSY to ITQ and Beyond

MSY Under Open Access

During the middle decades of the 20th century, fishery management policy was dominated by the concept of maximum sustainable yield (MSY), which is the maximum harvest in weight or numbers of fish that can be taken each year without causing progressive decline in the size of the harvestable stock. The concept of MSY derived from the developing understanding of population dynamics in ecology and had a solid foundation in ecological theory. Fishery scientists devised mathematical procedures for estimating MSY from data on catch, fishing effort, age structure and growth derived from the fishery itself or scientific surveys. These procedures remain the basis of quantitative stock assessment.

The legitimacy of MSY as a management policy for open access fisheries was based on the twin goals of maximizing employment opportunity in coastal communities and maximizing food supply from the sea. A number of problems emerged, however, in open access fisheries managed under the MSY policy:

1. Because entry into the fishery was unrestricted and relatively cheap large numbers of individuals engaged in the fishery and fisheries typically had much more fishing capacity than was needed to

harvest MSY;

2. Because of overcapacity in the fishery many fishers did not catch enough fish to make a reasonable living and fishing dependent communities tended to be poor; and

3. Because of overcapacity, MSY was frequently exceeded so that fish stocks declined and yields were compromised.

MSY Under Restricted Access

The basic economic theory of open access fisheries, which accounted for these problems, was worked out by Scott Gordon (1954) and others quite early on but did not have much influence on fishery management policy until the 1960s. By the 1960s, however, many valuable fisheries were in serious decline and governments were forced to bail out their fishers. Arguments for an "economic rationalization" of fisheries seemed to offer a way out. The first step toward this rationalization, limiting the number of licensed fishers, was taken by many countries in the 1960s and 1970s (Townsend 1990). There was considerable optimism that limited entry policies would ultimately reduce excess capacity, slow the race for fish, allow fishers to make a reasonable living, and possibly allow governments to collect some rent from the fisheries. A number of events combined to reduce the effectiveness of license limitation in achieving these goals:

1. Criteria for obtaining a license were often not very stringent and, in the lead up to implementing the policy, fishers raced to meet the criteria. As a consequence, considerable excess capacity was initially licensed in most limited entry fisheries. To bring down the number of license holders, governments were forced to undertake expensive programs to buy fishers out of the fisheries;

2. The fishers willing to be bought out tended to be the less skillful fishers so that reductions in capacity were not as great as the number of retired licenses and vessels suggested (typically about 20% of fishers catch 80% of the fish);

3. As the remaining fishers began to reap greater profits they poured additional capital into their vessels, improving comfort and safety but also increasing fishing power. Overcapacity in the form of too many fishers was replaced by overcapacity in the form of too much technology. Management agencies have introduced ad hoc policies to address this problem with variable success;

4. Limited entry tended to favor full time fishers over part time fishers. Part time fishers who sold their licenses often had few alternative sources of employment to supplement their incomes. In addition, licensed fishers have tended to relocate from small coastal communities to urban centers so that the policies have often had a negative impact on coastal communities;

5. Fishers who remained in the fishery were usually better off under limited entry than under open access. However, as more fisheries were placed under limited entry the ability of fishers to switch from one fishery to another to even out natural fluctuations in species abundance were constrained (unless they held licenses in a number of fisheries); and

6. Those who were issued a license at the inception of a limited entry fishery often reaped a windfall profit when they sold their license. This sometimes raised animosity among those who did not receive a license. More significantly, however, as the value of licenses soared, it became economically very difficult for new fishers to enter the fisheries.

Although the implementation of limited entry has not been without problems the policy has not been a failure. Fishers in limited entry fisheries generally realize a much greater economic return than under open access. Annual fishing license fees also increased dramatically in most limited entry fisheries, so that governments recovered some rents from the fishery. Government revenues from the fisheries generally remained much lower than administration and management costs, however. Townsend (1990) concluded that the most successful limited entry programs were those that were the most restrictive at the outset or that took steps to reduce the number of licensed vessels or fishermen early on. A recurrent problem has been increases in capacity through capital investment in technology, even in fisheries where management was designed to prevent such increases. Thus, limited entry has not done much to reduce the race for fish, to simplify fishery management, or to improve conservation. The conservation issue is critical as global fish stocks are in steep decline. In a controversial article, Worm et al (2005) estimated that if current trends continue all currently fished stocks will be collapsed by mid century. Stock conservation is also an ongoing problem in US fisheries (Rosenberg et al. 2006).

Townsend (1990) also noted that the success of limited entry policies depended a lot upon their acceptance by fishers. Where fishers were opposed to the policy, they had innumerable opportunity to sabotage it. Fishing communities often have informal social traditions that govern many aspects of fishing. When management policy co-opts those traditions, success is much more likely. This is a powerful argument for engaging fishers in management planning (Grafton et al. 2006).

Strengthening Property Rights, ITQs

Individual transferable quotas (ITQs) is the policy developed to resolve the problems that had emerged from the implementation of limited entry. The ITQ is a much more specific form of property right than the limited entry license in that it specifies a maximum amount of harvest for the quota holder. According to Wyman (2008) and others, the implementation of ITQ policies was greatly encouraged by the seaward extension of coastal states' jurisdiction that took place under the Law of the Sea

Convention in the mid 1970s. Coastal states now have jurisdiction over most of their continental shelves, the most productive fishing areas. That means they can implement regulations that can not be undermined by foreign flag vessels. Indeed, much of the enthusiasm for the Magnuson Fishery Conservation and Management Act when it was passed in 1976 centered on the belief that foreign fishers would be kicked out of American fisheries.

ITQ policies have been implemented by a number of coastal states around the world (Beddington et al. 2007) and the trend is to increasing application of this policy (Costello et al. 2008). ITQ policies have not been widely implemented in the US, however, for a variety of reasons but primarily due to fisher opposition (Criddle and Macinko 2000, Griffith 2008). ITQ policies are expected to confer a considerable number of benefits for both fishers and fishery agencies including (See, Squires et al. 2005, Oceans of Abundance (www.edf.org/article. cfm?contentID=8791) Anderson and Holliday (2007), Leal (2005) for additional information):

1. *Reduce or end race for fish*. Because fishers own a specific fraction of the allowable catch they can organize their fishing to take that fraction at a time that best suites their needs. There is no incentive to rush to the fishing grounds and fish as hard as possible to get the fish before other fishers do.

2. *Improve economic efficiency of fishery*. Under ITQ policies, fishers no longer have an incentive to build overcapacity. They can choose vessel designs and gear that minimize their costs of fishing, thus eliminating overcapacity.

3. *Create incentive for fishers to take responsibility for conservation/management*. The more productive the fish stock, the greater each fishers absolute catch. Thus, under ITQ policies, fishers have an incentive to ensure the stock is managed to maximize the sustainable harvest.

4. *Can improve fishery selectivity and reduce by-catch*. To the extent that catching non-target species increases fishing costs, fishers will have an incentive to avoid by-catch. This will be particularly the case where non-target species are also under quota regulation and excessive by-catch can result in closure of fishing grounds. Because they have flexibility in when and where to harvest (there is no race for fish), ITQ holders can choose times and fishing locations that minimize by-catch.

5. *Increase safety and professionalism among fishers*. Fishers in ITQ fisheries typically make good incomes and can afford to equip their vessels with proper safety gear and refrigeration to maintain the quality of their catch. Because there is no race for fish, fishers can travel and fish when weather conditions are suitable rather than feeling constrained to fish regardless of sea or vessel conditions.

6. *Make conservation and recovery of depleted stocks easier/more likely*. Because ITQ fishers

have an incentive to ensure that their fish stocks are well managed they are more receptive to the goals of conservation and stock recovery. Also, ITQ fisheries tend to have fewer participants so that monitoring for compliance is easier.

7. *The fishery can become self-financing*. Because ITQ fisheries are expected to generate considerable rent from the resource the participants can be taxed to cover the cost of management. Typically, management of ITQ fisheries becomes more collaborative between management agencies and fishers. Indeed, when expected to pay the costs of management, fishers demand a big say in how the fishery is managed.

Proponents of ITQ policies argue that, because of these benefits, virtually all fisheries should be administered this way. There is considerable evidence that ITQ fisheries, in general, perform better economically, are less likely to be overfished than fisheries managed under other policies and are generally able to support the costs of management (Costello et al. 2008, Hilborn et al. 2005). However, there are also a number of recurring problems in fisheries managed under ITQ policies:

1. *High-grading and/or excessive discarding*. Although ITQ policies can encourage reductions in by-catch, in some situations they can also exacerbate the problem. Since quota holders are restricted to their individual quotas there is an incentive to include only the highest valued fish in the quota share. If fish differ in value in relation to size or flesh color, or other characteristic, there is an incentive for fishers to discard lower valued catch and fill their quota with higher valued catch. Also, if the management regime does not allow a fisher to land species outside his quota license, he may be forced to dump catch of species that, in other circumstances, he might have landed.

2. *Smaller fishers are often forced out of fishery*. As was the case with limited entry, smaller scale fishers are more likely to sell their quota to cover short-term debts and can never afford to buy it back. Thus, ITQ systems tend to favor full time, well capitalized fishers over part timers. Part time fishers can, thus, lose an important seasonal or intermittent source of income.

3. *Concentration of quota in a few hands*. A major concern among fishers has been that ITQ and other property rights systems in fisheries will lead to corporatization of the fishery in which a few wealthy corporations own most of the fishery. Most ITQ policies have been implemented with restrictions on quota concentration. However, there are many ways around such restrictions.

4. *Creates a class of "armchair" fishers*. Fisheries managed under ITQ do not necessarily demand that it is the quota holder who catches the fish. Where quotas are freely transferable, some quota holders choose to lease their quota right to another fisher rather than catching it themselves. This can help

to reduce over-capitalization as those who lease quota do not need to own and maintain a vessel. However, quota leasing can also be a step toward corporate concentration of quota.

5. *Fishers relocate to urban centers*. As was seen in restricted entry fisheries, as fishers become wealthy under ITQ policies they tend to relocate to major population centers so that coastal fishing communities suffer loss of population and income.

6. *New fishers cannot enter*. The cost of purchasing quota to enter the fishery can be prohibitive for prospective new fishers.

7. *In multispecies fisheries it can be difficult to ensure efficient harvest of all species*. Usually multispecies fisheries are closed once one or two species have reached or exceeded their quota. As a result, some ITQ holders may be prevented or severely restricted in attempting to full their quotas. This can be true regardless of management regime but the problem can be made worse when fishers are not able to fish strategically among species.

8. *Designing and implementing the system can be expensive and divisive*. The negotiations involved in designing and implementing and ITQ system can be divisive and strain relationships among fishers and between fishers and managers. For an ITQ system to be implemented, data and understanding of the fish stock must be sufficient to establish a sustainable total allowable catch. Costs of acquiring this information, if it does not exist, can be high. The rules governing who gets quota and how much they get can be particularly contentious. As was the case with limited entry, fishers will try hard to meet the criteria and get quota in the months leading up to implementation of ITQs, even if they have little history of fishing for the species. Quota sales by those who succeed can also generate windfall profits.

Several countries (New Zealand, Iceland) have gone almost exclusively to ITQ policy. Others, like Canada, have put a portion of their fisheries under ITQ policy. Costello et al. (2008) examined the likelihood of stock collapse under ITQ policy compared with other policies and showed that a much lower proportion of fisheries were collapsing under the ITQ policy. Although collapse is a rather severe consequence of overfishing, the result suggests that, in general, stock conservation is better under ITQ policies than open access of limited entry. In general, therefore, ITQ fisheries perform better ecologically and economically than open access and limited entry (Branch 2009). The other issues with ITQ listed above, however, are real and need to be considered in designing policy (Brandt 2005, Stewart and Walshe 2008, Minnegal and Dwyer 2008, Murray et al. ND).

Combining Property Rights, Community Quotas and Cooperatives

ITQs are the most popular form of property right in fisheries at the present time. However, ITQ

policies may not be a good solution for many fisheries. A number of researchers have shown that when quotas are owned by individuals, they tend to accumulate in the hands of more wealthy fishers and that successful fishers tend to relocate from small coastal communities to large urban centers. To support the viability of remote coastal communities, community based quotas may be better. The community based quota system in Alaska provides a useful model (Mansfield 2007). In this program, because the coastal community (or consortium of communities) owns the quota, any income it generates goes to sustain the community rather than particular individuals. Community based quotas may be particularly appropriate for less mobile species like shellfish but can also work with widely distributed mobile species as the Alaska program has demonstrated.

The private salmon ocean ranching firms in Alaska represent another kind of community owned quota. Members of the firm contribute to the cost of building and operating salmon hatcheries and ocean net pens where salmon fry are held and fed until they are released at a time and size that will maximize ocean survival. Fisheries on returning salmon are constrained to protect less productive wild populations and the enhancement firm has exclusive rights to returning fish that are surplus to hatchery brood stock (Pinkerton 1994b, Smoker et al. 2000). Because many of the salmon returning to the enhancement area are harvested in common pool fisheries, fishers who are not members of the enhancement firm benefit significantly from the ocean ranching program. Nevertheless, members of the firm have exclusive access to a substantial additional harvest that both supports the enhancement program and provides an additional profit.

Another type of restricted access fishery involving community ownership is cooperatives that form around sector specific TAC allocations or among groups of ITQ owners. Although legislation allowing fishers to form marketing cooperatives has been on the books for more than 70 years (the Fishermen's Collective Marketing Act of 1934), early attempts to form cooperatives ran afoul of antitrust legislation and few successful cooperatives were formed (Kitts and Edwards 2003). In 1997, however, the four catcher/processor companies in the offshore US Pacific whiting fishery successfully formed a cooperative (the Pacific Whiting Conservation Cooperative) to share the benefits of efficient harvest of their sector's TAC. Formation of the Coop was made possible by restrictions on entry of new vessels into the offshore fishery and allocation of a specific portion of the overall Pacific whiting TAC to the offshore sector by the Pacific Fishery Management Council. In effect, the offshore sector had been given a guaranteed share of the catch and it was to their collective advantage to negotiate a harvest agreement that minimized inputs and maximized product value.

Subsequently, catcher/processor vessels in the Alaska Pollock fishery successfully lobbied Con-

gress to pass legislation enabling them to form a similar cooperative. The American Fisheries Act of 1998 established the necessary conditions and fishery participants formed the Pollock Conservation Cooperative. Other groups of fishers with defined TAC shares have pursued similar arrangements. Criddle and Macinko (2000) have argued that formation of cooperatives is easier and more efficient than attempting to negotiate ITQs and, as a result, it is unlikely that any more US fisheries will adopt ITQ policies. Although the formation of cooperatives is relatively recent it does appear that they facilitate early retirement of excess fishing capacity and perform well economically.

Territorial Use Rights Fisheries

Territorial use rights have a long history in fisheries. They were the primary form of fishery administration among west coast aboriginals and are still commonplace in the coastal fisheries of developing countries. The lobster fiefs of Maine are a storied example in colonial fisheries (Acheson 1975). Formally, however, TURFs are not practiced in North American fisheries (although the zones within which Alaska enhancement firms alone are allowed to fish can be considered a form of TURF as can the inshore/offshore fishing zones in some fisheries). TURFs have been at the heart of management of Japanese coastal fisheries for centuries, however, and recently Chile has adopted TURFs as the basis of its coastal fishery management (Makino and Matsuda 2005, Cancino et al. 2007). In both Japan and Chile, the TURF is a property right bestowed on a group of local fishers by the central government (Fishery Cooperative Associations (FCAs) and associated Fishery Management Organizations (FMOs) in Japan and Management Exploitation Areas (MEAs) in Chile). The local fishers effectively own and administer the territorial fishing right, establishing their own rules of membership, fishery regulations, and enforcement in the context of broad policies set by the central government. According to Cancino et al. (2007), TURFs have certain advantages over ITQ policies in terms of harvest effectiveness:

1. TURF rules can distribute fishing effort more effectively over the territory whereas ITQ fishers tend to concentrate on and overfish the most productive areas. Both FMOs and MEAs adopt rules to reduce congestion at hot spots and take advantage of spatial heterogeneity in fishing grounds.

2. TURF policies encourage self-monitoring, enforcement and sanctions. Fishers on the grounds have the best opportunity to observe and report on rule breaking. In both the Japanese and Chilean TURFs fishers exert considerable peer pressure on colleagues to follow the rules and some have committees specifically charged with monitoring and enforcement. Some Chilean associations have adopted graduated sanctions that are applied according to the severity and circumstances of the infraction.

3. TURFs encourage better management of multispecies fisheries and ecosystems. Since ITQs are generally allocated for individual species, ITQ holders have no incentive to consider the impact of

their harvest on other species or ecosystem functions. Participants in a TURF can explicitly organize their fishing to sustain ecosystem structure and processes to maximize overall community productivity.

4. TURFs allow for the potential of full integration of natural and artificial production from fisheries. Both Japanese FMOs and Chilean MEAs engage in small scale aquaculture. Integration of capture fisheries and aquaculture is rare in other contexts.

5. TURFs allow regulations, monitoring, and sanctions to be tailored to local conditions. In most ITQ fisheries monitoring and enforcement remain the responsibility of centralized management agencies. These agencies do not have the capacity to administer spatially explicit management rules. TURFs, however, have the flexibility to develop rules specific to their needs.

Restricted Access in California Fisheries

Restricted access, in many of the forms described above, is a fishery management tool employed by California prior to and following passage of the MLMA. This section describes California's approach to restricted access.

Early application of restricted access was known as "limited entry," a way to license or permit limited numbers of participants in fisheries that historically had been open access.[90] The first limitations in California were enacted by the Legislature in the 1970s for herring, and shortly thereafter for salmon. Also known as "limited access," the application of the policy in a number of fisheries over many years was not consistent. (California DFG 2000) Efforts to achieve more consistency began before passage of the MLMA. The Commission adopted a restricted access policy in 1999 that was the product of discussions that began in 1996 in response to requests from fishery participants in a variety of sectors. The Department had convened a limited entry review committee to reconcile the various limited entry fisheries enacted by the legislature over the previous two decades. According to a 2000 Department report the committee was tasked with developing a consistent standard for evaluating restricted access proposals and responding to legislative action, such as limited entry for Dungeness crab.

A draft was completed in February and revised in March 1997, but no action was taken until August 1998. The Commission approved a draft policy for public review, which was the 1997 version with several unresolved issues including permit transfers and renewals, quotas, and vessels. Public response to that draft was incorporated in a second draft policy submitted to the Commission for its June, 1999 meeting. This version contained 22 specific policies described in nine sections with narrative ra-

[90] Some forms of limited entry do not qualify as a restricted access fishery as currently defined. Rock crabs, for example, have no form of entry, but are not a restricted access fishery because there is no capacity goal.

tionale and explanations. It was discussed in two noticed, special public hearings, and adopted at the June 17-18 meeting. A final policy document was transmitted to the Commission, after some revisions by the Department, on August 10, 1999. (Fish & Game Commission 1999)

The broad meaning of limited access is shared between the commission policy document and the MLMA, but the tools to implement a limited access policy and the effects of such policies are subject to ambiguity and some dispute. The Fish and Game Code (Section 8100) defines limited entry fishery as a fishery in which the number of persons who may participate or the number of vessels that may be used in taking a specified species of fish is limited by statute or regulation. The MLMA defines restricted access as a fishery in which the number of persons who may participate, or the number of vessels that may be used in taking a specified species of fish, or the catch allocated to each fishery participant, is limited by statute or regulation. (Section 99).

The Commission's restricted access policy does not further define restricted access fishery, but sets out many other details. It describes and encourages the use of restricted access programs as one tool to accomplish goals of promoting sustainable fisheries, providing for orderly fisheries, promoting conservation, and maintaining long-term economic viability. Other specific policy statements call for substantial involvement by fishery participants, regular review, specific capacity goals, and permits, and set out program elements. Rights-based systems are described, discussed and permitted, but not required. The policy devotes significant detail to transferability and vessel replacement issues. The policy initially proposed several gear types as candidates for restricted access fisheries.

Since its adoption, the policy has been the topic of Commission discussions at meetings in 2005, 2007, 2008 and currently. Review and adaptation of the policy is listed as a long-term priority on the Commission's policy agenda. There is some discrepancy between the policy and the MLMA about whether restricted access programs are to be reviewed every four years or every five years. There also have been problems with inconsistent standards for inclusion in limited entry fisheries between the Commission's policy on permits (Section 5) and the statutory requirement for inclusion of licensed fishermen in limited entry programs (Code Section 8101-8104). This conflict arose in the market squid fishery FMP, for example. A review of the restricted access provisions of the Dungeness crab program in 2002 found that it was only partially consistent with the Commission's policy and failed to limit the number of traps used in the fishery, therefore not achieving any actual reduction in effort.

Concluding Comment

The spectrum of policies available to manage fisheries has expanded dramatically in the past few decades. The trend has been from open access toward more and more restrictive forms of

property rights. Presently, the emphasis is on individual property rights. But no single policy is appropriate for all fisheries. Recreational fisheries, for example, are probably best administered under an open access policy with input controls and some output controls such as size limits and bag limits. For commercial fisheries, the nature of the fishery, the species being exploited, their ecology, the fishing communities involved, should determine the appropriate policy. The MLMA seems to provide enough flexibility to permit a variety of policies if that is what Californians want.

References

Acheson, James M. 1975. The Lobster Fiefs: Economic and Ecological Effects of Territoriality in the Maine Lobster Industry. Human Ecology 3:183-207

Anderson, Lee G., and Mark C. Holliday (Ed.). 2007. The Design and Use of Limited Access Privilege Programs. NOAA Technical Memorandum NMFS-F/SPO-86. 156 p.

Anyanova, Ekaterina. 2008. Rescuing the Inexhaustible… (The Issue of Fisheries Subsidies in the International Trade policy). *Journal of International Commercial Law and Technology* 3:147-156.

Beddington, J. R., D. J. Agnew, and C. W. Clark. 2007. Current problems in the management of marine fisheries. *Science* **316**:1713-1716

Branch, Trevor A. 2009. How do individual transferable quotas affect marine ecosystems? *Fish and Fisheries* 10: 39–57

Brandt, Sylvia. 2005. The equity debate: distributional impacts of individual transferable quotas. *Ocean & Coastal Management* 48:15–30

Brodziak , Jon, Steve X. Cadrin, Christopher M. Legault, and Steve A. Murawski. 2008. Goals and strategies for rebuilding New England groundfish stocks. Fishery Research 94:255-366.

California Department of Fish and Game. 2000. History of Fish and Game Commission Policy on Restricted Access Commercial Fisheries. Intergovernmental Affairs Office. March 20, 2000.

California Fish & Game Code. Marine Life Management Act (as amended to July 2004) Fish and Game Code Sections 90-99.5, 105, 7050-7090, 8585-8589.7, 8842 and 9001.7.

California Fish & Game Commission. 1999. *Fish and Game Commission Policies Regarding Restricted Access Commercial Fisheries.* Prepared by the Department of Fish & Game and approved by the Commission June 18, 1999. Available online at http://www.fgc.ca.gov/policy/p4misc.asp#RESTRICT

Cancino, José P., Hirotsugu Uchida, and James E. Wilen. 2007. TURFs and ITQs: Collective vs. Individual

Decision Making. *Marine Resource Economics* 22:391–406

Clark, Colin W. 1990. *Mathematical bioeconomics. : the optimal management of renewable resources.* New York, Wiley.

Costello, Christopher, Steven D. Gaines, and John Lynham. 2008. Can Catch Shares Prevent Fisheries Collapse? *Science* **321**:1678-1681.

Criddle, Keith R., and Seth Macinko 2000. A requiem for the IFQ in US fisheries? *Marine Policy* 24:461-469.

Gordon, H. Scott. 1954. The economic theory of a common-property resource: the fishery. *Journal of Political Economy* 62:124-142.

Grafton, R. Quentin, Ragnar Arnason, Trond Bjørndal, David Campbell, Harry F. Campbell, Colin W. Clark, Robin Connor, Diane P. Dupont, Rögnvaldur Hannesson, Ray Hilborn, James E. Kirkley, Tom Kompas, Daniel E. Lane, Gordon R. Munro, Sean Pascoe, Dale Squires, Stein Ivar Steinshamn, Bruce R. Turris, and Quinn Weninger. 2006. Incentive-based approaches to sustainable fisheries. *Canadian Journal of Fisheries and Aquatic Sciences* 63:699–710

Griffith, David R. 2008. The ecological implications of individual fishing quotas and harvest cooperatives. *Frontiers in Ecology and Environment* 6:191–198

Hilborn, Ray, and Doug Eggers. 2000. A Review of the Hatchery Programs for Pink Salmon in Prince William Sound and Kodiak Island, Alaska. *Transactions of the American Fisheries Society* 129:333–350

Hilborn, Ray, J. M. (Lobo) Orensanz, and Ana M. Parma. 2005. Institutions, Incentives and the Future of Fisheries. *Philosophical Transactions of the Royal Society: Biological Sciences* 360:47-57

Hilborn, R. and C.J. Walters. 1992. *Quantitative fisheries stock assessment: Choice, dynamics and uncertainty*. Chapman & Hall, London.

Jackson, Jeremy B. C., Michael X. Kirby, Wolfgang H. Berger, Karen A. Bjorndal, Louis W. Botsford, Bruce J. Bourque, Roger H. Bradbury, Richard Cooke, Jon Erlandson, James A. Estes, Terence P. Hughes, Susan Kidwell, Carina B. Lange, Hunter S. Lenihan, John M. Pandolfi, Charles H. Peterson, Robert S. Steneck, Mia J. Tegner, Robert R. Warner. 2001. Historical Overfishing and the Recent Collapse of Coastal Ecosystems. *Science* 293:629-638.

Kitts, Andrew W., and Steven F. Edwards. 2003. Cooperatives in US fisheries: realizing the potential of the fishermen's collective marketing act. *Marine Policy* 27:357–366

Leal, D.R. 2005. Fencing the fishery: a primer on ending the race for fish. Atlantic Institute for Market

Studies, Halifax, NS. (Adapted for Canadian Audiences by Peter Fenwick and Laura Jones.

Makino, Mitsutaku, and Hiroyuki Matsuda. 2005. Co-management in Japanese coastal fisheries: institutional features and transaction costs. Marine Policy 29:441–450

Mansfield, Becky. 2007. Property, Markets, and Dispossession: TheWestern Alaska Community Development Quota as Neoliberalism, Social Justice, Both, and Neither. *Antipode* 2007:479-499.

Minnegal, Monica, and Peter Dwyer. 2008. Managing risk, resisting management: Stability and diversity in a southern Australian fishing fleet. *Human Organization* 67:97-108.

Murray, Grant, Teresa Johnson, Bonnie J. McCay, Kevin St. Martin, and Satsuki Takahashi. ND. Cumulative effects, creeping enclosure, and the marine commons of New Jersey. Available at: http://dlc.dlib.indiana.edu/archive/00004158/01/Murray_121101.pdf

NRC. 1999. *The Community Development Quota Program in Alaska.* Washington DC: National Research Council, National Academy Press.

Ostrom, Elinor. 1990. Governing the commons: the evolution of institutions for collective action Cambridge University Press, Cambridge, EN.

Pinkerton, Evelyn W. 1994a. Local Fisheries Co-management: A Review of International Experiences and Their Implications for Salmon Management in British Columbia. *Canadian Journal of Fisheries and Aquatic Sciences* 51:2363-2378.

Pinkerton, Evelyn W. 1994b. Economic and management benefits from the coordination of capture and culture fisheries: The case of Prince William Sound Pink Salmon. North American Journal of Fishery Management 14:262-277.

Rosenberg, Andrew A, Jill H Swasey, and Margaret Bowman. 2006. Rebuilding US fisheries: progress and problems. *Frontiers in Ecology and the Environment* 4:303-308.

Smoker, W., B Bachen, G. Freitag, H. Geiger, and T. Linley. 2000. Alaska ocean ranching contributions to sustainable fisheries. P. 407-420 In: E. Knudsen, C. Steward, D. MacDonald, J. Williams, and D. Reiser (eds.) *Sustainable fisheries management: Pacific salmon*. CRC Press, Boca Raton, FL.

Squires, Dale, James Kirkley, and Clement A. Tisdell. 1995. Individual Transferable Quotas as a Fisheries Management Tool. *Reviews in Fisheries Science* 3:141-169

Stewart, James, and Kim Walshe. 2008. Compliance costs and the small fisher: A study of exiters from the New Zealand fishery. *Marine Policy* 32:120–131

Townsend, Ralph E. 1990. Entry Restrictions in the Fishery: A Survey of the Evidence. *Land Economics* 66:359-378

Weinstein, M.L. 2000. Pieces of the puzzle: solutions for community based fisheries management from native Canadians, Japanese cooperatives, and community based researchers. *Georgetown International Environmental Law Review* 12:375-412.

Worm, Boris, Edward B. Barbier, Nicola Beaumont, J. Emmett Duffy, Carl Folke, Benjamin S. Halpern, Jeremy B. C. Jackson, Heike K. Lotze, Fiorenza Micheli, Stephen R. Palumbi, Enric Sala, Kimberley A. Selkoe, John J. Stachowicz, Reg Watsond. 2005. Impacts of Biodiversity Loss on Ocean Ecosystem Services. *Science* 314:787-790.

Wyman, K.M. 2008. The property rights challenge in marine fisheries. *Arizona Law Review* 50:511-543